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ABSTRACT

Described is a project which relates psycholinguistic processes (reading and listening comprehension) of handicapped children to the training needs of special education teachers through the application of Computer-Assisted Teacher Training System technology in performance based teacher education. The first chapter discusses preservice special education and presents the nine objectives of the project. Chapter 2 reviews the literature and considers implications and conclusions relating to the following topics: interactive teaching behaviors and reading and listening comprehension, language strategies of retarded children, reading studies involving educable mentally handicapped children, reading comprehension and organization in the retarded. Chapter 3 describes the methods used in the project observation system, training materials, coder training, and coder competencies evaluation; tutor background, practicum objectives and tutoring procedures; and teaching phases and experimental design). The results of the project (including 11 tables) are discussed in chapter 4. Chapter 5 summarizes the project in terms of objectives, perspective, methods, data sources, and results, and draws conclusions about the effectiveness of the project. (BD)

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THE EFFECTIVENESS OF A COMPUTER-ASSISTED TEACHER TRAINING SYSTEM (CATTS) IN THE DEVELOPMENT OF READING AND LISTENING COMPREHENSION INSTRUCTIONAL STRATEGIES OF PRESERVICE SPECIAL EDUCATION TRAINEES IN A TUTORIAL CLASSROOM SETTING

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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CHAPTER ONE

INTRODUCTION AND OBJECTIVES

Introduction

The present project attempted to related the psycholinguistic processes of handicapped children to the training needs of special education teachers through the innovative application of CATTS technology in competency-based teacher training. The application of extensive research and inquiry into (a) a psycholinguistic approach to reading and language skills (Blanton, Sitko and Gillespie, 1975; Goodman & Burke, 1968, 1969, 1973; Ryan and Semmel, 1969; (b) organizational language and cognitive strategies of retarded and disadvantaged children (e.g. Blanton, 1974; Semmel, 1967; Sitko, 1976; Sitko and Semmel, 1972, 1973), (c) specific instructional methods to facilitate reading by retarded and learning disabled children (Gillespie and Sitko, 1974), and (d) competency-based teacher education provided the theoretical framework for the present investigation. The Computer-Assisted Teacher Training System (CATTS), developed by Semmel and his associates (Semmel, 1968, 1972, 1975; Semmel, Sitko et. al., 1976), served as the prime vehicle for the discrimination, generation, and evaluation of specific teaching strategies in reading comprehension by preservice special education trainees. Specifically, the project compared the relative effectiveness of CATTS instantaneous and delayed video feedback as contrasted with verbal supervisory feedback in the development of specific reading and listening strategies in a structured one-to-one tutorial situation with mildly handicapped children.

Preservice Special Education

There appears to be general agreement among teacher educators that present practices used to prepare teachers of handicapped children must definitely be improved (e.g., Blatt, 1966; Cruickshank, 1967; Deno, 1973; Dunn, 1968; Lilly, 1971; MacMillan, 1972). At the same time, recent developments in the fields of special and regular education have posed challenges and problems to teacher training programs in special education. These developments include: (a) the accountability movement in public education (Barro, 1973; Lessinger, 1971; Morris, 1973; Vergason, 1973), (b) court decisions mandating against the exclusion of handicapped children from public school educational programs (Abeson, 1973, 1974, Martin, 1972; Ross, DeYoung, & Cohen, 1971), (c) questions raised by special education efficacy studies (Dunn, 1968; Kolstoe, 1972; Lawrence & Winshel, 1973; Rubin, Krust, & Balow, 1973), (d) court decisions regarding improper labeling and placement of minority children into self-contained special classes (Cruickshank, 1972; Gilhool, 1973; Weintraub, et al., 1971), (e) programs such as Project PRIME (Programmed Re-entry into Mainstream Education) (Kaufman, Semmel, & Agard, 1973) in the state of Texas, which focus on the integration and re-entry or mainstreaming of mildly retarded, emotionally disturbed and learning disabled children into regular classroom settings (Bradfield, et al., 1973; Hafner, 1972; Schwartz, et al., 1972), and (f) a movement in special education and regular education away from program-based toward competency-or performance-based teacher education programs and teacher certification patterns (Deno, 1973; Houston & Howsam, 1972; Meyen & Altman, 1973; Rosner, 1972; Schmieder, 1973; Schwartz, et al., 1972; Semmel, Semmel & Morrissey, 1976; Shores, Cegelka & Nelson, 1973.

In order to meet these challenges, there is a critical need in the field for the generation of innovative personnel training models and procedures to improve teachers' skills in working with cognitively and affectively handicapped children in special and regular class settings.

The application of computer technology offers one promising approach to the generation of innovative teacher training models and procedures. In the past decade, educators have participated in the technological revolutions provoked by advances in computer development. Most large school systems use computers for scheduling, general accounting, grading, and other automatic functions which previously demanded the long and arduous labor of relatively skilled personnel. In addition, the advent of "real-time" systems and shared-time arrangements has brought the capabilities of rapid anal/sis and feedback directly into the learning situation through programmed instructional techniques and various audio-visual approaches. Computer-monitored instructional programs are currently attempting to reach large numbers of pupils with fewer numbers of teachers. Others seek to individualize instruction for specific children. Indeed, computer-assisted instruction (CAI) has already been applied to instructional programming of handicapped children in our schools (e.g., Meredith, 1971; Stolurow, 1960) and to pre-and inservice teacher training programs (Cartwright, Cartwright, & Robine, 1972; Noffsinger & Daiker, 1973). Undoubtedly, as such efforts progress and cost factors are controlled, we will be faced with the reality of a technological revolution in special education within the coming decade.

The question which arises is: "Can we presently utilize computer technology for preparing teachers to work effectively with handicapped children in special and/or regular class settings?" To our knowledge,

little attempt has been made to explore and evaluate the potential contribution of computers in clarifying training objectives and improving teacher competencies in existing teacher education programs. Hence, there is a current need for the exploitation of computer technology in teacher training programs in special education.

Research and developmental activities directed toward realizing a cost-effective Computer-Assisted Teacher Training System (CATTS) for training special education personnel have continued at the Center for Innovation in Teaching the Handicapped (CITH), Indiana University, for the past four years under the direction of M. I. Semmel (1972, 1975). A detailed description of the prototype CATTS is presented in Semmel, 1975. It is sufficient at this point to indicate that CATTS focuses on automated approaches to systematic collection, summarization, analysis, feedback, storage, and retrieval of teacher-pupil interactions. CATTS is conceptualized as a closed-loop cybernetic system capable of producing continuous instantaneous and/or delayed feedback of relevant teacher-pupil interaction data to a teacher trainee in the classroom, so that modification of behavior can be realized through regulatory teaching moves in accordance with predetermined training objectives. The comprehensive system is designed to produce a feasible, cost-effective means of systematic observation, real-time analysis, storage, and feedback of specific observation-coding data relevant to special education classroom teacher-pupil interactions. Immediate auditory and visual feedback delivery systems and corresponding data summaries have been developed for _in situ_ and after-session feedback of relevant teacher-pupil variables in practicum teaching environments. In essence, CATTS is a versatile and comprehensive delivery system which can be applied in many ways within the teacher training field. CATTS can be of great assistance in the

accomplishment of training objectives for competency- or performance-based training programs in special education. In our opinion, CATTS represents a quantum leap in teacher training in general.

CATTS is the translation of a heuristic teacher training model developed by Semmel. According to this model, teacher education is conceptualized as a problem in adult learning. The learner is required to generate teaching behaviors appropriate to the training situation. Teaching itself may be seen as a performance skill which is best learned by practice in a realistic setting with accurate feedback about one's performance. Successful acquisition of teaching skills is viewed as dependent upon (a) specification of "appropriate" behaviors, (b) valid and reliable feedback of performance during practice or acquisition trials, (c) immediate availability of feedback information, and (d) access to previous performance in training sessions.

The training model (Figure 1) proposes that, if the goal of the training procedure is to produce effective teacher performance, the trainee should first learn to discriminate among relevant teaching performances, and then generate or produce them. He must then be able to evaluate the appropriateness of particular teaching performances so that he can use them effectively in specific situations. In essence, the process of discrimination is the acqusition of knowledge; generation is the skill in use of that knowledge; and evaluation is the process of evaluating that knowledge and the use of skills from that knowledge in order to assure desired pupil behaviors. At the same time, the trainee should develop and display appropriate professional attitudes toward exceptional children. The teaching performance may be seen at three levels; i.e., the level of individual behaviors, the level of patterns of behavior, or the level of teaching "environments," which may be seen as

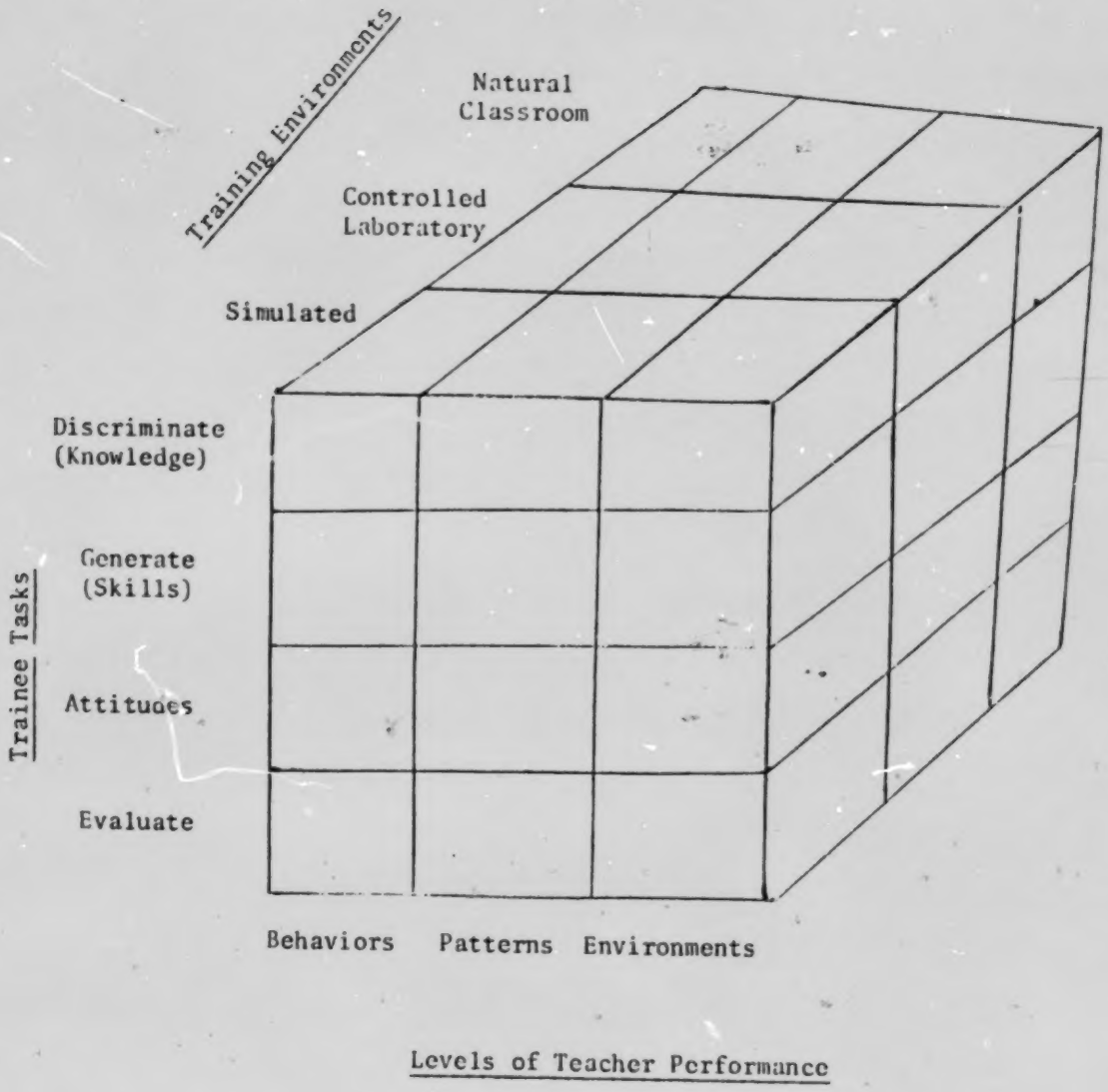

Figure 1: A Model for preservice training of teachers

clusters of behavior patterns. The model also identifies the setting in which the training occurs as a critical variable in teacher education. Training may be carried out sequentially in a simulated teaching setting, a controlled (laboratory) teaching situation, or in the natural classroom. There is some evidence that training in the natural environment may be economically unfeasible, and it may be unsuitable for particular training purposes because trainers are unable to control the occurrence of events necessary for observing or performing. There are also administrative and ethical problems in consistently utilizing real classroom time for observation and training purposes. Hence, a critical training variable, according to this model, is to provide inexperienced trainees with the opportunity to teach and receive immediate and focused feedback in a controlled (laboratory) teaching setting about specific aspects of their teaching behaviors. At the same time, the model acknowledges the importance and effectiveness of in situ practicum experiences with handicapped children for preservice trainees.

The interacting skill components described in the model are operative within cognitive/academic, affective/management, social, linguistic, motor, and other special educational contexts. They vary as a function of the particular characteristics and developmental levels of the handicapped pupils for whom they are prescribed. Other variables to be considered in applying the model include: situational classroom characteristics, motivational characteristics, feedback characteristics, non-interactive features of teacher behavior including assessment and planning behavior, and nature of instructional materials. In translating the training model to CATTS, the major premise is that the more immediate the knowledge of results, or feed-

back, the more efficient the discrimination, generation and evaluation of relevant teaching behaviors, patterns, and environments.

The investigation of the cost-effectiveness and efficacy of CATTS in areas deemed of critical importance to special educators would be of great benefit in determining the feasibility and significance of such systems in efficiently preparing personnel in special education. The development of specific teaching competencies in the field of reading offers an ideal area for investigation into this issue. The majority of EMR children in special and/or regular classrooms reveal weaknesses or deficiencies in reading and/or listening comprehension skills (Blanton, Sitko & Gillespie, 1975, Gillespie & Johnson, 1974; Cawley, Goodstein, & Burrow, 1972). The significance of this deficiency is reflected in the knowledge that reading is a communication process and that meaning gain must be seen as its significant outcome. Most teaching competencies in reading, particularly those related to reading comprehension, involve complex patterns or chains of teaching behaviors which have to be systematically developed to achieve trainee competency levels that optimize pupil growth. Education investigations must give weight to the interrelationship between organizational vehicles (e.g., CATTS) and content (e.g., linguistic models of comprehension). One of the strengths of the current sutdy is that it makes use of current psycholinguistic data concerning thought/language relationships, thereby insuring the soundness of the content to be conveyed in the testing of the proposed vehicle.

Presently, feedback to preservice trainees in practicum situations about their interactive teaching behaviors occurs retrospectively, through either subjective verbal summaries from supervisors or delayed simple summaries of relatively unsophisticated observational data. However,

closer analysis of each of these processes reveals that the trainee often derives little information about the specific behaviors (objectives) deemed important by the program. Furthermore, the supervisor often has no systematic technique for focusing on those teaching behaviors she/he considers relevant, and is often times forced to rely on vague ad hoc impressions.

Allied with this is the further problem that between supervisory conferences there is often little communication between supervisor and teacher. Thus, if supervisory and/or observation data are to be used in training, they cannot be fed back to a trainee in real time. Knowledge of results can therefore have no immediate control or effect on the classroom environment from which the data are drawn.

On the other hand, the CATTS system holds out good hope of overcoming the major drawbacks of prevailing training methods--the lack of continuous feedback in real time and the teacher's lack of information about his performance in relation to the behaviors or patterns calculated to realize the educational or instructional goals of the class. The CATTS system has real potential as a delivery system for increasing the productivity and efficiency of training for critical teaching behaviors and teaching patterns in reading instruction because it provides immediate, detailed and focused feedback of cognitively oriented teacher-pupil interactions.

The present study investigated the effectiveness of CATTS in the acquisition of specific reading and listening comprehension teaching skills by preservice trainees in special education. This study also researched the productivity of the system and its efficiency in modifying the identified teaching behaviors and patterns of teacher trainees in a tutorial (laboratory) classroom setting. Productivity in this study was measured in terms of modification of the trainees' interactive teaching behaviors and teaching patterns

in desired directions. A direct comparison was made against the prevalent supervisory mode of feedback currently employed in special education preservice training programs.

Objectives

Main Objectives

1. To determine the effectiveness of a Computer-Assisted Teacher Training System (CATTS) as contrasted with verbal supervisory feedback in the development of critical reading and listening comprehension teaching strategies in preservice special education teacher trainees in a tutorial (laboratory) classroom setting.

2. To test the effectiveness of reading comprehension instructional strategies developed out of a psycholinguistic and cognitive view of the language process in use with retarded learners in a special classroom setting.

Subobjectives

1. To adapt CATTS for the training of critical patterns of teacher interaction in reading and listening comprehension instruction.

2. To implement the CATTS paradigm with teacher trainees at Indiana University as a part of their preservice educational program in special education.

3. To determine the rate of acquisition of critical teaching behaviors and patterns of behavior with the traditional mode of supervisor verbal feedback.

4. To determine the rate of acquisition of critical teaching behaviors and teaching patterns with instantaneous visual and delayed video feedback

via CATTS.

6. To compare the relative effectiveness of CATTS instantaneous and delayed feedback with supervisor verbal feedback in a laboratory classroom practicum setting.

7. To develop a reliable observation-coding instrument for use in training preservice teachers in special education to discriminate among, generate and evaluate specific teaching behaviors and patterns related to reading and listening comprehension instruction.

CHAPTER TWO

REVIEW OF LITERATURE

Interactive Teaching Behaviors and Reading and Listening Comprehension

Although there is general agreement that the learner should be taught to interact systematically and in a cognitively hierarchical manner in reading and language arts, and it is agreed that the teacher's questioning behavior often sets the pattern for the way children respond and anticipate responding in readings, Borg, et. al. (1970), Crawford et. al. (1975), Gall (1970), Gallagher and Aschner (1966), Guszak (1967), Sanders (1972), Zimmerman and Bergan (1971), and several other investigators have found that most teachers ask predominately cognitive-memory or factual-type questions.

This finding seems to especially be true in the area of reading and listening comprehension, even though it is known that questioning techniques are extremely powerful in determining those cognitive operations in which pupils engage (e.g., Hillman, 1972; Lynch, et. al., 1973; Sanders, 1966; Taba, 1966; Wright & Nuthall, 1970). Hatcher (1971) and Forsyth, et. al. (1971) found that questions presented in basal readers to enhance reading comprehension are mostly factual in nature. Furthermore, there is also evidence that teachers of EMR children use a greater percentage of factual questions in reading and other instruction than teachers of nonretarded

elementary children (Cawley, Goodstein & Burrow, 1972; Fine, Allen & Medvene, 1968; Greenough, 1976; Lynch and Ames, 1971; Minskoff, 1967). Their rationale here reflects the model of reading which views physically smaller units as being psychologically easier to manage.

In addition, Herman (1967) has found that teachers are less flexible and more teacher-centered in discussion with retarded children. Because the teacher may think that these children are not capable of higher-level thinking skills, she/he may ask only factual or low-level cognitive questions, or not attempt the use of high-level cognitive skills such as divergent thinking (Cawley, Goodstein & Burrow, 1972).

There is additional evidence that in heterogeneous classrooms groups, where much of the teaching is under the direct verbal guidance of the teacher, the pupils of lesser ability or pupils for whom teachers have lower expectations tend to receive fewer and less helpful opportunities to respond (Beez, 1972; Brophy & Good, 1970, 1974; Jackson, 1968; Kranz et. al., 1970; Lynch & Ames, 1971, 1973; Rist, 1970; Rowe, 1969). Teachers frequently give less able children fewer opportunities to respond, less time to respond, and less constructive feedback. Educable mentally retarded children as a group seem to need frequent opportunities. Moreover, Wolf, King and Huck (1968) found that methods and materials may have the incidental result of teaching the child to accept printed material indiscriminately. Hence, teacher behavior has not adjusted to the handicapped child's need for

the kind of patterned behavior, the consistent intelligent behavior, that will help him/her attack new words securely and give him/her a sense of how to interact with an author's message--as well as with details.

Language Strategies of Retarded Children

An examination of various reviews of the research literature on linguistic problems of the mentally retarded (MR) of the last decade (e.g., Belmont, 1966; Denny, 1964; Goulet, 1968; Jordan, 1967; McCarthy, 1964; Spradlin, 1963; Spreen, 1965 a, b) reflects the minimal influence of important developments in the fields of linguistics, psycholinguistics, and information theory. For instance, little attention has been given to the organizational strategies employed by MR children in processing language. Research related to the language of MR children has traditionally focused on the performance aspect of language behavior, i.e., descriptive phonological and semantic aspects of the child's speech, and the psychological variables which affect such behavior. Researchers have devoted relatively little attention to the study of the grammatical or generative aspects of the language system of retarded children. Since the major variables which define retardation (such as subaverage intellectual functioning and impairments in adaptive behavior) are so highly correlated with language behavior, it has been found useful to view the problems of retarded children in the context of contemporary views emanating from the field of psycholinguistics (Semmel, 1967; Sitko, 1976; Sitko and Semmel, 1973).

Several psychological theorists have emphasized the importance of organizational processes in learning and memory (Broadbent, 1958; Bruner, Goodnow & Austin, 1956; Mandler, 1967 a, b; Miller, 1956; Neisser, 1967; Tulving, 1962). From the standpoint of information theory, investigators have stressed the limited capacity of the human information-processing system,

and the importance of subjective organization or recording of stimulus input in maximizing the amount of relevant information that one is able to receive, process, and remember. Current views appear to characterize the child as an active learner who possesses a repertory of organizational processes from which he must select those appropriate to the particular learning situation. In fact, Spitz (1966, 1973) has maintained that the slower learning performance of MR children may be due to a particular deficit in the organization or grouping of the material to be learned. However, Spitz stated that the question is not whether retarded individuals organize materials, but in what manner, under what conditions, and how efficiently.

Semmel (1967, 1969) hypothesized a fundamental difference in the organizational strategies used by EMR and nonretarded children in processing linguistic information. According to this view, EMR children use primarily "sequential-associative" strategies in decoding and encoding verbal materials, while "hierarchical" and "sequential-associative" strategies seem to be synchronized in nonretarded children. Of the two, sequential-associative strategies are relatively more primitive. They develop as the child directly experiences associations between linguistic units in his language environment, and they are nongenerative. Hierarchical grammatical and semantic strategies are more abstract, frequently taking the form of rules governing the permissible relationships between linguistic units. Because the generality of such strategies makes them more powerful tools for generating and processing language, they are probably related to more proficient language behavior than are sequential-associative strategies.

Semmel and his associates contended that their studies, in addition to

providing evidence for a qualitative difference between the organizational strategies of EMR and nonretarded children, suggested that EMR children probably have the linguistic competence to recode linguistic units or bits of information into efficient hierarchical classes or categories through the use of abstract rules. Unlike nonretarded children who naturally tend to avail themselves of this competency by invoking efficient rules in verbal learning situations, EMR children lack the propensity to use rules in verbal learning contexts. The retarded child is more sensitive to simple associative cues for organizing linguistic units than to higher-order organizational cues in processing verbal stimuli. In linguistic terms, Semmel (1967) suggested that:

> Perhaps the retarded child operates primarily on the surface structure of the language and derives relatively little from the base structure of linguistic constructions. He is, therefore, relatively more dependent on the frequency of occurrence of linguistic forms and patterns as he experiences them in his natural language environment (p. 43).

However, these children probably can develop and use efficient strategies when environmental cues for their use are made distinctive. Using a variety of verbal learning paradigms, considerable evidence for this position was presented by Semmel and his associates (Agard, 1971; Herzog, 1968; Semmel, 1967, 1969; Semmel, Barritt & Bennett, 1970; Semmel & Bennett, 1970; Sitko, 1970; Sitko and Semmel, 1972). These studies were comprehensively reviewed elsewhere (Sitko & Semmel, 1973).

Numerous other studies using a variety of learning and memory paradigms have supported the view that retarded children, in contrast to nonretarded children, demonstrate inefficiencies in the organization, grouping and/or retrieval of linguistically presented information (e.g., Butterfield & Belmont,

1972; Cawley, Goodstein & Burrow, 1972; Cobb & Barnard, 1971; Ellis, 1970; Gallagher, 1969; Gerjuoy & Spitz, 1966; Goodstein, 1970; Gruen & Korte, 1973; Jensen, 1970; Martin, 1967; Milgram, 1971; Riegel & Taylor, 1974; Sitko, 1976; Smith, 1967; Vitello, 1973). In addition, several investigations have examined the efficacy of training EMR children to use specific verbal learning strategies to facilitate the acquisition and retention of verbal material, and they have revealed significant positive results (Blanton, 1974; Gerjuoy & Alvarez, 1969; Martin, 1967; Ross, 1971; Ross, Ross & Downing, 1973; Vitello, 1973; Turnbull, 1974; Whitely & Taylor, 1973).

Considerable evidence in support of the assumption that EMR children probably have the ability to recode or organize linguistic units into hierarchical components when prompted was provided in an investigation by Sitko and Semmel (1972). The authors studied the effects of phrasal cueing on the free recall of EMR and nonretarded children. Free recall and coding of sentences is most representative of information processing in the classroom (e.g., reading comprehension, mathematical problem-solving, concept formation). The study was based on the premise that retarded children probably have the competence, when prompted, to recode linguistic units into hierarchical components. Retarded children appear to process linguistic strings as though guided by a Markovian model rather than by a transformational-generative model (cf. McNeill, 1970; Menyuk, 1971; Olson, 1970). Nevertheless, the omission of completely novel utterances from EMR children in natural language situations suggests that their language behavior is rule-governed. Hence, it was assumed that EMR children possess the competence for "learning" hierarchical organizational skills in verbal learning situations. Based on this premise, it was reasoned that if the language of the retarded child is governed by the same rules as is the language of his nonretarded peers, then

making phrase boundaries distinctive through pausal cues should cue chunking strategies and increase recall of sentences by EMR children.

EMR and nonretarded children were presented with four types of nine-word strings which differed in the degree of syntactic and associative structure. Each subject was presented with one of three cueing conditions. The findings indicated that EMR children revealed their best recall performance relative to nonretarded children when pausal cues (.5 sec. pauses) were provided at phrase boundaries within sentences containing standard syntax. Recall of EMR children was relatively inferior when subjects were not provided with these cues but were required to impose a structure in recoding verbal strings which conformed to standard syntactic rules. The nonretarded group also exceeded retarded children in recall when given sentences with distorted systactic structure and phrasal cueing. The results of the cueing study emphasized the importance of phrasal cueing within the context of standard syntax on the free recall of sentences among retarded children. It was inferred from the findings that it may be possible to improve the storage and retrieval abilities of retarded children through the development of specific pedogogical cueing systems which are representative of meaning storage units projected in training models of language.

Reading Studies Involving EMR Children

Since evidence exists that, under research conditions which tend to highlight isolated word units, retarded and nonretarded children use different organizational strategies for processing verbal input, one might expect that knowledge of memory and organizational processes would have been applied to children's reading behavior and subsequent comprehension

of written material. Unfortunately, this has not been the case for either retarded or nonretarded children. In fact, the literature on reading comprehension has revealed that attempts to organize and synthesize the information concerning reading comprehension have in general made few references to memory and organizational processes (Ruddell, 1968; Smith, 1960; Strang, 1965). It should be noted, however, that several writers have casually referred to memory processes in reading comprehension. Spache (1966) and Barrett (quoted by Clymer, 1968), for example, have included memory as one dimension of reading comprehension in their taxonomies of reading behavior. Although some writers have made reference to memory in reading comprehension, few have made an attempt to operationalize and examine empirically the relationship and functioning of memory and organizational processes in the comprehension of written connected discourse.

The lack of such information is unfortunate since one of the most persistent problems in the education of retarded children is that of effective reading instruction, particularly reading comprehension (Gillespie & Johnson, 1974). Unfortunately, most programs for EMR children have been unsuccessful in their attempt to train children to read at levels commensurate with their ability. Achievement studies have revealed significant differences between retarded and nonretarded children in reading performance (Blake, Aaron, Westbrook, 1967; Bliesmer, 1954; Dunn, 1956; Levitt, 1972; Shotick, 1960). In his review of research in education of the MR, Kirk (1964) reported a general finding which is all-too-familiar to teachers of EMR children. The research had indicated that MR children in special classes read below their "mental-age-reading-grade expectancy."

This finding is especially frustrating to teachers of EMR children, who tend to predicate their expectations of reading success on the child's MA level. After reviewing several studies of the reading performance of EMR children, Spicker and Bartel (1968) concluded that there was no one characteristic of EMR children which could account for all reading difficulties. As a result, it was not possible to prescribe a reading method that was effective with most EMR children. Cegelka and Cegelka (1970) reported similar findings in their review.

A comprehensive study by Woodcock and Dunn (1967) compared six approaches of teaching reading to EMR children. The types of experimental method studies included (a) language experience, basal reader, and programmed text approach using traditional orthography, (b) a programmed text and language experience approach using i t a (initial teaching alphabet), and (c) a basal reader approach using rebus symbols. The sample used for this study consisted of EMRs who were at the earliest stages of beginning reading or had not yet learned to read. Unless they voiced objections, volunteer teachers were randomly assigned to one of the six reading approaches. At the end of two years the results of the Woodcock and Dunn study indicated no significant differences between groups receiving the six treatments on seven measures of reading ability.

Another study which compared different reading approaches with mildly retarded children was an investigation by Dunn and Mueller (1966). These researchers investigated the efficacy of (a) i t a in teaching beginning reading, and (b) the Peabody Language Development Kit in stimulating oral language and verbal intelligence with a group of disadvantaged first grade children. Briefly, the results relating only to the use of i t a after one year showed that a

group of children receiving i t a performed significantly better on a reading achievement measure than groups using a basal reader approach. Likewise, results from the second year of the study (Dunn, Pochanart, & Pfost, 1967) were similar. An intriguing aspect of this study is that the teachers involved in teaching the experimental groups were provided with incentives (extra pay, etc.) not provided to control teachers. From this, it can be concluded that results may have been caused by the Hawthorne Effect. In order to control for this effect, Dunn, Neville, et al. (1967) attempted to determine if i t a instructed groups of disadvantaged children would perform significantly better than control groups when teachers in all groups were provided with extra support and incentives. In addition to i t a, the effectiveness of two other reading approaches was examined--Words in Color (WIC) and a Supplemental Conventional Reading Program (SCRP). Results after one year of this three-year study revealed no differences between the total experimental reading groups and the control group on a measure of school achievement. However, the SCRP treatment group tended to score higher than the other two reading treatments.

A recent study by Neville and Vandever (1973) sought to determine whether synthetic or analytic reading instruction would facilitate learning and transfer of words for mentally retarded children. This investigation appears to be the first to examine the differential effects of the two methods on transfer using retarded Ss. Briefly, results revealed that (a) both retarded and NR children recognized significantly more words when the synthetic method was used, (b) both groups performed significantly better when the synthetic method was used for words taught and for transfer words, and (c) no differences were found in the learning and transfer of MA-matched retarded and nonretarded groups. These findings would suggest that the synthetic method, by emphasizing letters and the way they can be

combined to form words, encouraged the children to develop a strategy that was useful in decoding new words.

Programmed Instruction and the use of teaching machines have received attention as techniques for teaching reading to the mentally retarded. Numerous studies (e. g., Blackman & Capobianco, 1965; Price, 1963) have compared programmed instruction to traditional classroom methods with educable retarded children. Greene's (1966) comprehensive review of the effectiveness of such techniques indicated that when these comparisons were made there were essentially no achievement differences between the two methods in the majority of studies.

Unfortunately, reviews of the literature and studies which have compared different methods and approaches for teaching reading to retarded children have provided very little definitive evidence in support of one method over another. Perhaps many of these studies have placed too much concern on the search for a methodological panacea without giving necessary consideration to individual abilities and disabilities of specific learners, or of the parameters of the language process. Further, most methodological studies with retarded Ss have made comparisons among methods which place emphasis on the word as the basic unit of reading. Goodman (1969), however, has called for a shifting of the focus from words to the comprehension strategies of the reader. Words, Goodman has contended, should always be viewed as units of larger, meaningful units. This approach, therefore, focuses the learner's attention on segmental units, i.e., clauses which are based on the semantic and associative features of language. Such a model could explain the effectiveness of the pause, used in the Sitko & Semmel, 1972, research.

The child's ability to process and organize linguistic information may be strongly related to the nature of the reading process. One of the earliest expositions of a language-based approach to reading instruction was by Lefevre (1964). He emphasized the importance of the sentence as a meaning-bearing unit and suggested that in the teaching of reading, words should be regarded as a minor linguistic unit, while the importance of intonation and stress patterns, and of clauses and sentences should be emphasized. Using a cognitive framework, Neisser (1967) described reading as externally guided thought in which the stimulus, rather than determining perception, serves as a prompter for an ongoing language process. Similarly Kohlers (1968) hypothesizes two aspects in the perceptual identification of items: initial schematization and subsequent impletion or filling-in.

Goodman's (1969) hypothesis-testing view of the reading process mentioned above assumes that the ultimate goal of reading is direct passage from print to meaning, without going through surface speech processes in between. According to Goodman (1972), reading is a psycholinguistic guessing game which uses language cues selected from perceptual input. In order for the child to engage in the reading process, he/she must be able to possess language information that is encoded in graphic symbols (Goodman, 1968).

Goodman (1965, 1968, 1969, 1972) has designated "cues" or "cue systems" that must be used by the reader in obtaining meaning from written language. He considers "miscues" in oral reading to be very important to the teacher because they provide information about the child's language skills. Cues may be based upon (a) clues within words, (b) the flow of the language in terms of operations such as function order, inflection or inflectional agreement, intonation or reference to what comes prior to or after the word in question, and (c) cues external to the language and the reader such as

his/her dialect, experimental and family background (Goodman, 1968). If error analysis of a child's reading miscues is qualitative rather than quantitative, the teacher will be able to use oral reading as a means of assessing the language strategies a child employs while engaged in the reading process. The Reading Miscue Inventory developed by Burke and Y. Goodman (1972) is one source for a qualitative analysis of a child's miscues and could serve as a framework for the study of a retarded child's cueing systems.

In summarizing the various models for reading based on the active participation of the reader, Ryan and Semmel (1969) have shown that considerable evidence exists that reading is a cue sampling process, rather than one requiring absolute discrimination of detail. They conclude that children's reading material should be written to maximize the child's opportunity to develop efficient habits of forming and testing hypotheses. Moreover, the beginning or retarded reader should be encouraged by the teacher to apply appropriate high-order language strategies--such strategies are already available from oral language usage. Emphasis should be focused on "conceptual" aspects of reading rather than on "perceptual" aspects and relations, or on single words.

The views of Ryan and Semmel (1969) were incorporated into the rationale of a study conducted by Sitko, et al. (1972) which sought to lay the groundword for a psycholinguistically-based reading program. Specifically, the study attempted to (a) establish word-association (W-A) norms for a group of EMR children and (b) empirically examine the effects of the children's word associations on reading performance. Such a study, it was expected, would lead to the development of methods for practical utilization of norms in the writing of reading materials for EMR children. Results indicated

that a free W-A task with a group of young EMR children did reveal commonality of associational responses. This commonality of associational responses also existed for responses to sequentially constrained stimuli within a sentence, but did not exist for EMR pupils' sequential responses to stimulus sentences. No support was found for the efficacy of using high-association word pairs in sight vocabulary lessons for primary EMR children.

It was noted that all the teachers in the study used some variation of a basic phonic analysis approach to teaching reading. This approach takes the word as the basic unit of reading and does not attend to the relevance of linguistic context (semantic and syntactic relationships) in determining word perception and comprehension. The authors concluded that in order for associative proclivities of handicapped learners to be useful in enhancing their acquisition of reading skills, the learners must develop a set or be taught to attend to the associative (semantic) properties or features of word pairs and the associative constraints implicit in high-association sentences. The authors stressed the need to develop various activities and games that encourage retarded readers to attend to and use relevant linguistic organizational strategies which take advantage of the familiar structure of reading materials. Much of the reading instruction with retarded children has not been based upon language structure but rather upon graphic features of the language. The Sitko et al. investigation was a positive step toward developing such reading instruction.

In summary, the reading methodology studies presented offer little evidence to support the use of one method over another where both methods reflect either the same model of reading or reflect models which isolate

and stress selected features with retarded children. Perhaps the most exciting developments, however, are those which emphasize reading instruction based upon knowledge of psycholinguistics.

Reading Comprehension and Organization in the Retarded

As stated previously, reading researchers have only alluded to the possible relationship between organizational processes and reading behavior. In fact, a review of the literature on reading has revealed a paucity of research dealing with organizational processes and reading in retarded children. Three recent and important investigations by Bilsky and Evans (1970), Evans (1970) and Blanton (1974), on the other hand, have explored the possibility that the difficulty of retarded children in reading comprehension may be the result of a basic inability to organize verbal input for storage and retrieval during the act of reading. Bilsky and Evans (1970) sought to determine whether the ability to organize verbal material is central to the attainment of such reading skills as comprehension. Institutionalized retarded subjects with CAs between 12 and 19 and IQs ranging from 45 to 70 were used as subjects. All Ss were divided into good and poor reading groups on the basis of reading comprehension scores. Each subject was presented a 20-word free recall task composed of five words from each of four conceptual categories. Analysis of data revealed that subjects in the good reading comprehension group clustered significantly more during free recall than subjects in the poor reading comprehension group.

Evans (1970) studied the effects of reading level and mode of presentation on category clustering and recall performance of retarded subjects. Ss for the investigation were 50 retarded "adolescents" (CA 15.11-22.2)

from high schools in a public school system. The Ss were randomly assigned to one of three experimental conditions, that is, mode of stimulus presentation. There were two unimodal (a visual and an auditory) presentation conditions and a bimodal (visual plus auditory) stimulus presentation. Each subject was presented a 20-word free recall list composed of words from four conceptual categories. Following the completion of the free recall task, all Ss were divided into above- and below-median subgroups on the basis of overall reading grade level scores.

In contrast to the results of Bilsky and Evans (1970), the results of the Evans study revealed that clustering performance was not a function of general reading ability. The bimodal presentation was found to have a significantly greater facilitating effect on recall than the other two presentations. It did not have, however, a significant effect on clustering performance. The overall correlation coefficient between performance and clustering was found to be statistically significant.

The purpose of an extensive investigation by Blanton (1974) was to study the relationship of organizational abilities to the comprehension of written and orally presented connected discourse in EMR and nonretarded children. Subjects for the study were 40 EMR children and 40 children with chronological ages between 9 and 12 years. In order to obtain a measure of subjective organization (SO), each S was individually administered 12 successive free recall learning trials on a 12-word stimulus list. Upon completion of the free recall task, the following reading and listening comprehension measures were randomly administered: (a) a traditional, standardized measure of reading comprehension, (b) a traditional reading comprehension measure with reading reinforced by listening, (c) a cloze test, and (d) two measures of listening comprehension as measured by

verbatim recall across three paragraph conditions. The three paragraph, or treatment, conditions differed as to the chunking or organizational patterns provided: (a) no cueing within the text of the passage, (b) distinctive pausal cueing at phrase boundaries within the text of the passage, and (c) distorted pausal cueing at phrase boundaries within the text of the passage.

The results supported six of the seven predictions made in the investigaion. NR Ss scored significantly higher than EMR Ss on the five measures of reading and listening comprehension. As predicted, EMR children obtained significantly higher recall scores on a distinctive phrasal cueing condition than either a no cueing or a distorted phrasal cueing condition. NR Ss received significantly higher scores on a no cueing condition than a distorted phrasal cueing condition, and on a distinctive phrasal cueing than a distorted phrasal cueing condition. Results revealed that the variation between the differences obtained for EMR Ss and NR Ss on a distinctive phrasal cueing paragraph and the differences obtained for EMR Ss and NR Ss on a no cueing paragraph were significant for one recall measure, but not for the other recall measure. EMR High Subjective Organizers and EMR Low Subjective Organizers did not obtain significantly different scores on three measures of reading and listening comprehension. Product-moment correlations involving subject variables showed that SO was moderately related to verbatim recall measures for the NR group, but was not related for the EMR group; SO was related to recall performance for NR Ss but not for EMR Ss.

One of the major conclusions of the investigation was that EMR children do possess the competence necessary for recoding certain types of information

when environmental cues are provided which facilitate the use of higher-order organizational abilities.

Implications

If teachers are to better meet the needs of retarded children in reading and listening comprehension, teacher training programs in special education should address themselves to this issue. In order to carry out interactive teaching activities in reading and listening comprehension based on the views presented above with retarded children, there is a critical need to train teachers in special education to be able to perform the following tasks:

1. Inform pupils of the nature of a reading or listening comprehension task, orient pupils to relevant information and cues, provide orienting concepts (advance organizers), set forth steps and procedural rules, and prepare pupils for useful forms of feedback in the instructional situation. Specific activities to be carried out by the teacher would include:

    a. Communicating clearly individualized instructions, procedures, and learning objectives to the handicapped child before reading instruction begins (i.e., reduce cognitive load on short-term memory).

    b. Improving storage of information by insuring that the handicapped child understands detailed steps and relationships concerning the nature of the reading comprehension task or objectives.

    c. Providing organizing and recoding cues in advance of reading instruction to help the handicapped child establish a preparatory set for attending selectively to the lesson (e.g., by providing spatially-cued verbal outlines of a story; asking organizing

questions; guiding the child to look for particular points or attributes of films, books, pictures, etc.).

d. Attracting and holding attention of handicapped child through focusing (verbal and gestural) and pausing procedures which orient the child to the particular learning task at hand.

e. Reducing irrelevant, distracting, and/or ambiguous information in introducing reading materials and lessons for handicapped children.

f. Developing ability to scan a group of pupils, while presenting reading material orally, in order to identify behavioral cues indicative of inattention and bafflement.

2. Utilize appropriate high- and low-level questioning techniques in order to systematically develop abstract concepts, principles (rules) and inductive reasoning in handicapped children. Specifically, activities to be carried out would include:

a. Introducing concept training in reading materials with highly familiar and meaningful material (i.e., which includes perceptual and associative verbal cues) so that the handicapped learner will have some recoding skills available and will achieve a sense of mastery.

b. Using questioning procedures to encourage pupils during a concept-oriented reading lesson to talk about familiar experiences and ideas that provide advance organizers for new concepts and new cognitive manipulation. This will be accomplished by supporting initial pupil organization of reading information by providing for an uninterrupted oral retelling before the use of

questioning procedures on specific components.

c. Using questioning procedures in reading comprehension lessons to stimulate and elicit elaborative pupil verbal expressions of personal feelings, beliefs, ideas and experiences as an end in itself.

d. Shaping and eliciting hierarchical classification and categorization skills in handicapped children during reading comprehension lessons through specific low-level and high-level questioning patterns.

e. Utilizing inductive questions during classroom reading dialogue to strengthen, encourage and guide active hypothesis testing and discovery procedures in handicapped children.

f. Asking appropriate redirecting, clarifying, and justifying questions and eliciting statements of handicapped children during reading comprehension lessons.

g. Using high and low-level questioning techniques to modulate or shift the cognitive level of discourse during reading comprehension lessons (e.g., factual, conceptual, theoretical).

h. Rephrasing and restructuring elicitation when pupil does not respond or responds inappropriately during comprehension tasks.

3. Arrange component subtasks of reading and listening comprehension lessons into a learning hierarchy, and identify efficient teaching patterns for developing comprehension skills in poor readers. Specifically, activities to be carried out would include:

a. Analyzing and correctly identifying the cognitive demands (skills and processes) involved in listening and reading comprehension lessons (e.g., Gillespie & Johnson, 1974).

b. Minimizing both the total number of "chunks" of information as well as the number of "bits per chunk" of information in oral and written language comprehension tasks. This involves reducing irrelevant, distracting, and/or ambiguous information in comprehension lessons for handicapped children.

c. Providing handicapped children with "pausal" and "intonational" cues which stimulate information recoding or "chunking" during discourse learning.

d. Including summarization, rehearsal, and review procedures as an integral part of language comprehension lessons.

e. Framing oral questions, based on written or oral discourse, which reduce the relative effects of forgetting due to interference (proactive or retroactive) or competing information and memory decay.

f. If possible, using inductive questions which ask for clarification of thought and lead the handicapped child into a new awareness or concept.

4. If teachers are to engage in the process of developing teaching strategies based on the child's oral reading measures, they must be competent in the following skills:

a. Analysis of reading materials according to level, organization, and content.

b. Utilization of graphs in recording pupil data.

c. Establishment of patterns of strengths and weaknesses in a child's reading strategies.

d. Analysis of a specific child's language patterns (e.g., dialect).

e. Analysis of language according to syntax, lexicon, intonation, and morphology (Burke & Goodman, 1972).

f. Categorizing of miscues according to Burke and Goodman (1972).

g. Programming teaching strategies to enhance reading strategies of the child.

The evidence from studies discussed previously indicated that EMR children do possess the competence to recode linguistic units into hierarchical components when supported by strong environmental cues. Considering the important role of organizational abilities in learning and memory, it seems logical to suggest the modification of relatively inefficient sequential-associative organizational strategies in EMR children to the more hierarchical rule-governed strategies. Such a modification in organizational strategies should result in greater academic success for EMR children, particularly in more rule-governed strategies. Such a modification in organizational strategies should result in greater academic success for EMR children, particularly in the comprehension of verbal material. If EMR children store information inefficiently, then the relationships between words in storage are primitive and, as a result, it would be difficult for EMR children to retrieve information. By encouraging retarded children to impose organization on linguistic input, their dependence on rote memory capacity and subsequent ability to comprehend verbal material.

Conclusions

As indicated by the review of literature presented in this project report, the language and reading comprehension skills of the handicapped have been of concern to many investigators in the field of special education. The processes involved in the acquisition of language and reading strategies with many mildly handicapped children have been demonstrated by the literature, and by the present investigators' empirical research, to

be deficient and to reflect primitive and inefficient levels of cognitive and linguistic processing. Moreover, it has been found that teacher behavior and curricular materials have influenced the psycholinguistic strategies that handicapped and normal children employ in language and reading comprehension. In the area of reading, teacher behavior has not adjusted to the mildly handicapped child's need for the kind of patterned behavior, the consistent intelligent behavior, that will help him/her attack new words securely and give him/her a sense of how to interact with an author's message -- as well as with details. It is important for teachers working with handicapped children to be aware of the cognitive demands and processes required of the learner during reading and listening comprehension. If teachers are to be more effective in enhancing the language skills of handicapped children, training programs should address themselves to training teachers of the handicapped to discriminate, generate, and evaluate their teaching behaviors, patterns and environments in language arts instruction. The present project will attempt to demonstrate the effectiveness of Computer-Assisted Teacher Training System (CATTS) in training special education pre service teachers to discriminate, generate and evaluate appropriate teacher questioning strategies for use in reading instruction with handicapped pupils. More specifically, the efficacy of CATTS in teaching preservice trainees to use high and low-level questioning behaviors to modulate or shift the cognitive level of discourse and to stimulate appropriate hierarchical pupil responses during reading and/or listening comprehension will be investigated.

CHAPTER THREE

METHODS

Since the present project combined aspects of both an experimental study and that of a preservice special education practicum course, coordination of a number of distinct operations were required. Table 1 illustrates the time line for development and operation activities of each of the major aspects of the project. The project built on previous developmental work involving the CATTS system is described in other sections of this report.

I. Development of Observation System, Training Materials, Coder Training and Evaluation of Coder Competencies

The category observation system used for measurement and feedback of teacher and pupil cognitive interactions during reading instruction was the Teacher-Pupil Question Response System (TPQR) developed by Sitko and Heshusius (1975). The TQRS was a revised version of an earlier system, i.e., the Pupil Cognitive-Response System (PCRS) developed by Sitko and Markowitz (1975). The TPQR is described in detail in Appendix F of this section. A list of the categories appears in Table 2. The newer version of the TPQR category-observation-coding system was designed to increase question appropriateness and response-to-question success rate of mildly handicapped pupils. The instrument sequentially measures hierarchical teacher cognitive demands as depicted in six types of teacher questions: (1) Discrimination; (2) Recall; (3) Sequencing/Paraphrasing; (4) Hierarchically Relating; (5) Inference and; (6) Problem Solving. The system also measures pupil responses to teacher questions, teacher responses to pupil questions, pupil questions, teacher and student talk on lesson subject, and pupil no-response.

It should be noted that the TPQR had undergone considerable developmental

Table 1. Time for Project Development

1975

July 1 - Development of Project Design

Aug 1 - Selection of 21 junior-level teacher trainees in special education as subjects

Sept 1 - Completion of Coder Training materials (training manual, 2 training audio tapes, scripts for verbal practice, selection of "live" classroom training tape, criterion tape)
- Selection of 11 mildly handicapped pupils
- Selection of 8 coders

Oct 1 - Pretesting of 11 pupils on standardized reading diagnostic and achievement tests by trainees
- Scheduling of 7 training sessions for coders (14 hours)
- Criterion testing of coders on TPQR category system (Oct. 28)
- Development of lesson plan format

Nov 1 - Design Computer Printouts
- Begin classroom coding of Baseline Teaching of 21 Tutors on the TPQR category system (Nov. 3). Each tutor observed and coded twice weekly

Dec 1 - Schedule maintenance check with expert coder in "live" classroom tutoring situation (Dec. 3, 4)

1976

Jan 1 - Schedule second maintenance check of 7 coders (Jan. 16-17) on Criterion Tape
- Revise observer training manual
- Continue Baseline Observations

Feb 1 - Continue Baseline Observations (9-14 lessons)
- Assign trainees to feedback conditions
- Give all trainees a copy of Module 1

Feb 15 - Give copies of Module 3A, 3B or 4 to tutors in CATTS Feedback Groups
- Begin First Treatment Phase - Administer Daily Computer Printouts

March 1 - Continue First Treatment Phase
- Administer Module 3B to Supervisory Feedback group

March 15 - Begin Second Treatment Phase

April 1 - Continue Second Treatment Phase (5-8 lessons)

April 15 - Begin Maintenance Phase (2 lessons)

May 1 - Administer project evaluation questionnaire to all trainees
- Interview all pupils with pupil questionnaire
- Administer Posttests to 11 pupils

June 1 - Analyze all Data

July 1 - Write up Final Project Report

Table 2. Categories of the TPQR Observation System

Teacher-Pupil Question Response (TPQR)
Observation System

I. DISCRIMINATION

II. RECALL

III. SEQUENCING/PARAPHRASING

IV. HIERARCHICALLY RELATING

V. INFERENCE

VI. PROBLEM SOLVING

VII. TALK ON LESSON SUBJECT

VIII. "NO", "I CAN'T", NO RESPONSE, "I DON'T KNOW"

IX. NOT CODABLE

testing before reaching its final version. The system had been developmentally tested for two months with the DITRMA consensus-coding system described in Semmel & Olson, (1977). Both audio and video tapes of classroom teacher-pupil interactions and classroom simulations were coded on button boxes during developmental testing of the utility of the system. The end product of this activity was an observer training manual including rules for button box coding (See Module 1, Appendix F). Scripts for practice coding and coder-training videotapes for training observers on the TPQR category observation system with DITRMA were also designed. Two training videotapes were produced. The tapes contained 39 and 36 question-response interaction segments, respectively. The categories of the TPQR were equally represented in the tape segments. The segments were taped approximately ten seconds apart. A script of the two training tapes appears in Appendix A. Additional training tapes which were developed for the Cog Strat Observation Category-Coding System (Semmel, Sitko, et.al., 1976) were used for additional training tapes when needed. Additional written examples were also constructed to supplement the verbal exercises contained in the observer training manual (See Appendix B). Two live video-tapes were selected of tutoring situations similar to those which the coders would be encountering in their live coding as coders. Finally a video-taped criterion test was constructed to test coder competency on the TPQR. The criterion tape contained 76 question-response interactions. All question-response categories were represented six times. Adding six examples of the categories "talk", "no-response", and "not codable" meant that a total of 166 entries had to be coded on the criterion tape (See Appendix C). Following production of these training and criterion materials, they were tested with

a number of CITH personnel. The primary goal of this testing was to estimate training time for scheduling purposes and to identify specific training problems. Following developmental testing of training materials, final versions were made.

Observer Training: Eight coders were hired through advertisement in the Indiana University student paper. At hiring, coders were told that they would be taught to code the classroom interactions of special education trainees using the TPQR category observation-coding system. They were warned that only those coders who achieved the required inter-and intra-rater criterion reliabilities would be used in the project. Table 3 provides an outline of the seven training sessions which covered a total of 14 hours. Acquisition of observation skills was facilitated by the computer-aided DITRMA consensus-coding system.

Following the seventh training session, coders were given the criterion test using the previously described training tape. The criterion tape was coded twice by each trainee with an interval of ten minutes between the two criterion codings. Both inter-observer criterion-related and intra-observer measures of observer agreement were obtained using the simple percent agreement measure developed by Frick and Semmel (1974). As recommended by Frick and Semmel, a simple percent agreement $\geq .85$ for each category was required for the criterion-related agreement measure before actual data collection could commence. Frick and Semmel (1974) have also recommended that measures of intra-observer agreement be obtained by showing the criterion tape containing unambiguous isolated examples twice to all observers in conditions parallel to those encountered in the filed. The purpose of an intra-observer agreement measure is to demonstrate the extent to which each observer can

Table 3. Outline of Coder-training Program (14 hours)

Training Sessions (total of 14 hrs.)

At hiring, trainees were assigned to read the training manual and to fill in the paper-pencil exercises.

Session 1 (2 hrs.)
- Conceptual overview of the categories
- Exercises of the first 4 categories were checked and problems discussed.

Session 2 (2 hrs.)
- Discussion of manual and checking of exercises was completed for the entire manual.
- Coders were introduced to DITRMA system. Coders practiced Training Tape I coding State 1 only (see p. 3 of the manual).

Session 3 (1½ hrs.)
- Practiced coding Training Tape I.

Session 4 (1½ hrs.)
- Practiced coding Training Tape I and II.

Session 5 (1½ hrs.)
- Practiced Training Tape II and two Cog Strat Training tapes.

Session 6 (2 hrs.)
- Coded Training Tape I and II.
- Practiced coding verbally read continuous script. The DITRMA feedback system was used without the videotape. This procedure was used to approximate live-speed coding skills.

Session 7 (1½ hrs.)
- Practiced coding from verbally read continuous scripts as in Session 6.
- Practiced coding from live-tapes.

consistently code under actual observational circumstances. Hence, an overall proportion of agreement measure $\geq .85$ was also demanded for the intra-coder criterion measure before coders were allowed to begin classroom coding.

The criterion tape was coded twice (on October 28, 1975) by each coder trainee, with an interval of ten minutes between the two criterion codings. Four coder trainees passed with criterion-related agreement scores ranging from .89-.98. The average score was .93. In addition to criterion-related agreement, intra-observer agreement measures were also obtained. All four trainees who had exceeded the .85 criterion-related agreement standard also exceeded the preset intra-observer agreement standard of .85. The range was from .88-.96, with an average score of .92. The remaining 4 trainees had two more training sessions (i.e., 4 hours) with the DITRMA system and then took a second criterion test. Their second criterion-related agreement scores ranged from .90 to .96. The average score was .94. The intra-observer agreement scores ranged from .94-1.00, with an average score of .97. Hence, the final range of criterion-related agreement scores was from .89-.98, with an average of .94. The final range of intra-observer reliability scores was .88-1.00, with an average of .94.

Once actual classroom coding commenced (in November), both criterion-related and intra-coder measures were obtained for coder maintenance checks as well. These maintenance checks were conducted about on-third of the way through the project. In addition, "live" maintenance checks using a CITH staff expert coder were performed throughout the study in order to give the CITH staff an indication of observer agreement with an expert during actual coding of classroom lessons. This was also done for reasons beyond that of obtaining agreement estimates in situ. Since observers never knew exactly

when the expert coder was going to double-code a given lesson, it was intended that observers would always anticipate such a possibility and come well-prepared each time. Reliability maintenance checks using the live coder were actually performed during the initial coding of tutor lesson (i.e., Baseline Teaching Phase) at the end of the first semester (December 3 and 4). The results of the maintenance checks revealed that the majority of the coders again exceeded the .85 standard on this initial maintenance check. The average score was .86, with a range of .71-.97.

At the beginning of the spring semester there were 7 coders still available. A second maintenance check was conducted at the beginning of the semester (January 16-17). The criterion tape was used to check coder performance. Three coders were able to pass the criterion without additional practice and training. Their criterion-related agreement scores ranged from .94-.97. The average was .95. Their intra-observer agreement scores averaged .95, with a range of .91-.98. The remaining four coders had additional training and then retook the criterion test. Their resulting criterion-related agreement scores ranged from .87-.94, with an average score of .91. The intra-observer agreement scores averaged .94, with a range of .90-.99. Hence, the final range of criterion-related agreement scores was from .87-.97, with an average of .93. The final range of intra-observer reliability scores was .90-.99, and the average was .94. While observational data was initially being collected during November and December, coders provided the CITH staff with feedback concerning their impressions of the adequacy of the TPQR observation system and the observer-training manual (i.e., Module 1, Appendix F). Based on this feedback and the observations of the CITH project staff, clarifications and

modifications were made on the training manual. The use of the revised observer-training manual began in the second semester by the preservice trainees in the project. See Appendix D. for examples of clarifications.

II. Tutor Background, Practicum Objectives and Tutoring Procedures

Tutors: The tutors in the project were 21 Indiana University undergraduate students, all special education junior-level majors enrolled in K495, Practicum in Special Education, under the direction of Dr. Sitko, during the fall and winter semesters, 1975-1976. All tutors (19 females and 2 males) were majors in the Program for Training Teachers of Mildly Handicapped Children (MHP), a two-year teacher education program specifically designed for preservice teachers who desired to teach mildly handicapped children in special and/or regular classroom environments. Tutors received three hours of academic credit for each of the two semesters. The two-semester Teacher Laboratory Practicum was required for all junior-level trainees in the MHP.

Tutor Training and Introduction to Practicum Objectives: The 21 preservice trainees were introduced to the practicum through classroom lectures at the beginning of the first semester. They were told that they would tutor one child, for two, one-half hour periods, during each week of the two semesters. They were also told that the practicum was designed to meet the following objectives:

1. To provide a laboratory classroom in which to practice and develop selecting teaching skills.
2. To assist a handicapped child who is below grade level in reading to improve his/her listening and reading comprehension skills.

3. To assist trainees in refining interactive teaching questioning skills by providing feedback on teaching performance.

During the initial 1 1/2 months of the practicum (August 25 - October 10), the trainees were taught how to give and interpret information and standardized reading tests. They were also taught how to write lesson plans using a decision-making model for diagnostic teaching developed by Gillespie and Sitko (1974). In addition, they were introduced to several reading curricula and teacher training multimedia packages at CITH. Specific CITH teacher training packages which were completed during this period included: (a) Specifying Behavioral Objectives; (b) Task Analysis; (c) Choose A Curriculum Package; (d) Teacher Made Reading Materials for the Handicapped; (e) Observing and Recording a Child's Behavior, (f) Informal Reading Inventory; and (g) A Decision-Making Model for Teaching the Handicapped. Descriptions of these teacher training packages are found in the "Directory of CITH Training Materials" published by CITH (1976).

Teacher-Pupil Selection and Tutoring Procedures: Tutors began working with their respective pupils at the beginning of October. Ten mildly handicapped (EMR) and one trainable mentally retarded child were the pupils worked with in this practicum. All children lived in a nearby rural community and were enrolled in a cooperative special educational program at the Indiana University Developmental Training Center (DTC). All pupils had been referred by their own school district as requiring a special educational program. The tutors and pupils were selected in a basically random manner to work together. The basic determinant to matching was corresponding time schedules between tutors and pupils. This method proved satisfactory and there were no changes required due to personality conflicts, etc. Before tutors began tutoring their pupils,

they gave them various informal and standardized tests under the direction of their DTC laboratory class teacher (B. Miller). This experience gave them the opportunity to familiarize themselves with the pupils and to assess entry level of their pupils on various reading skills. These measures included: (a) the Wide Range Achievement Test (WRAT); (b) the Survey of Primary Reading; (c) the Dolch Word List; (d) the Gates-MacGintie Reading Test, (e) the Peabody Picture Vocabulary Test (PPVT); (f) the Alphabet Identification Test; and (g) the Boehm Test of Basic Concepts. The pretest results of the tests are shown in Appendix H.

Each tutor began actual tutoring of his/her child for a half-hour session twice a week beginning at the end of October. The lessons were ready-oriented, with each lesson containing an entry test, the body and an evaluation. The tutors were required to submit a lesson plan and task analysis to the classroom teacher at least five days before the actual lesson was scheduled to be taught. The required format writing lesson plans are given in Module 2, Appendix G. The classroom teacher graded each lesson plan using the Checklist for Lesson Plan Evaluation shown in Module 2. This form rates each section of the lesson plan (i.e., Entry test, task analysis, objectives, criterion test for main and subobjectives and teaching strategies) on a five-point scale. The evaluation sheet was returned to the teacher each time a new lesson was submitted. The scale shown on the evaluation sheet was only used for the trainees' guidance in interpreting the lesson plans, but was not used in grading. Besides evaluation of lesson plans and necessary feedback concerning them, the classroom teacher was available to give advice to each tutor. Lesson objectives were evaluated in terms of their appropriateness to

the instructional level of the child.

Coding Procedures: All lessons which were coded took place on Monday through Friday between 8:30 and 12:00 noon. The trainees taught in a laboratory classroom at the I.U. Developmental Training Center (DTC). During the first semester, there were two tutoring stations in this classroom with wooden partitions separating each station. Hence, two tutors were able to have lessons scheduled at the same time. Tutors rotated between the two tutoring stations for each lesson. For the second semester, the tutor's academic schedule necessitated the addition of a third tutoring station. Hence, three tutoring sessions took place at one time during the second semester. Tutors were randomly assigned and rotated among the three stations for each lesson. Each tutoring station contained a small table and two chairs as well as a microphone, and each was isolated from the adjacent station(s) by the wooden eight-foot partition. Each table faced a one-way mirror, which ran along one side of the classroom. Behind the one-way mirror was a small room which contained the observation-coding station. Videotape cameras were installed in two of the tutoring stations.

The coder station contained four coding button boxes which were hooked up to the PDP-12 computer located in a nearby building, the Teacher Education Laboratory (TEL) at CITH. Other components in the station included an intercom to the computer center, two videotape recorders, a videotape monitor, six sets of earphones (two sets for each coding station) and three coding boxes. Before the coding began each morning, the equipment was turned on to check its working order. The TEL at CITH was contacted by intercoms to check if the computer equipment was in order there. The button boxes which provided the link to the PDP-12 computer were then turned on and the lesson coding was begun. The

actual method used for transmitting the tutor-pupil interaction to the computer is shown in Module 1 (Appendix F, pages 4-5). Coders were assigned to tutors and stations on a rotating basis so that they did not code the same person twice in one week and to ensure that they coded at a different station during each lesson. See Appendix E for a weekly schedule including sample forms for recording coding sessions. A form was made out for each lesson to record the time of tutoring, the computer storage box number, the type of feedback being used and any special notations about the lesson.

Two graduate students acted as coordinators for the daily coding activities. One individual was responsible for (a) the coders' scheduling, (b) assigning coder and tutor to a specific station for each lesson, (c) filling out the individual record sheet for each tutoring session, (d) recording the computer storage box number for each session on the individual record sheet, (e) setting up maintenance checks for coders, and (f) conducting practice and training sessions for those who needed additional coding experience.

The other coordinator worked primarily with the tutors and with data organization. Her activities included the following: (a) she kept records of student attendance; (b) ensured that each student received the proper feedback at the proper time; (c) filed the printout information for each session; and (d) listed and filed the videotapes from each lesson that was taped. In essence, both coordinators served as general overseers of the day-to-day coding operations.

III. Teaching Phases and Experimental Design

There were three teaching phases during the project. These were; (1) baseline, (2) feedback and, (3) maintenance.

Baseline: In the baseline teaching phase, trainees taught the lessons they had prepared without receiving CATTS or supervisory feedback on their lessons. The baseline lessons of the tutors were coded beginning November 3, 1975. The number of lessons taught without feedback varied from trainee to trainee. The baseline teaching always included at least the first nine lessons and varied up to the first fourteen lessons taught the baseline phase immediately followed the coder training phase of the project.

Feedback: Following baseline observations, each trainee was randomly assigned, using a table of random numbers, to one of three feedback conditions; (a) CATTS Instantaneous Scope Feedback, (b) CATTS Delayed Video Feedback, and (c) Supervisory Feedback. All subjects then received a copy of Module 1 (Appendix F), which presented a memo outlining the four criteria that determined the grade in the practicum and the major instructional objectives for the rest of the semester. The module further contained; (a) a description of the CATTS system, (b) the role of feedback in skill development and decision-making, and (c) the same TPQR observer-training manual (Module 1 minus page 4) developed by Heshusius and Sitko (1976), which was used earlier in the fall semester in training the project coders. The training manual described the terminology and definitions of TPQR observation system, together with examples of each category and exercises for coding. Tutors were instructed to learn to discriminate each category on the TPQR system although they would not need to actually code any lessons since coders had been hired for that purpose. Tutors in the CATTS Instantaneous Scope and Delayed Video Feedback conditions were next provided with either Module 3A or 3B, which explained the type of feedback they were to receive.

Scope-Feedback: Those who were to have Scope Feedback received Module 3A--Interpretation of Printout Feedback with Scope (see Appendix I). This module provided an example of the CATTS Printout Sheet they would receive immediately following each lesson. It also provided a clear explanation of every item on the printout, as well as the four major teaching goals or objectives for the balance of the semester. The first major goal indicated that teacher rate for each lesson should be 30-50% of all teacher verbal interaction. This criterion was selected in order to allow sufficient opportunities for the pupils to answer questions and receive appropriate feedback and probing on their responses to questions. Our previous experience with preservice trainees had revealed that they initially asked a preponderance of questions during tutoring lessons (over 50% of the total lesson), and provided relatively few opportunities for student-initiated talk, probing student responses, or positive feedback. The second major goal was to maximize the percentage of high-level questions relative to the percentage of low-level questions. As mentioned previously, the literature indicates that teachers in both regular and special classrooms use a greater percentage of factual or low-level questions in reading instruction. The third major goal was to ask in sequential order the total hierarchy of six questions on the TPQR system. It was felt that this goal would facilitate hierarchical questioning skills on the part of the tutor by providing a suggested pattern of questioning. The fourth and final goal was to obtain appropriate pupil responses to cognitive questions asked. For instance, if the tutor asked an inferential question from the pupil, then an inferential response was expected from the pupil. A matrix was shown on the printout which illustrated the tutor's efficiency in obtaining appropriate responses. The diagonal in the matrix showed the number

of "appropriate matches" made. An "appropriate match" occurred each time the tutor asked any question in the TPQR hierarchy and the pupil responded at the same level. The numbers in the two segments of the matrix gave the instances by cognitive level when the pupil response to a teacher question was at a lower or higher cognitive level in the TPQR system than the question asked. The printout also provided a summary of the teacher-pupil interaction sequence across time during the lesson (see Module 3A--Appendix I).

The seven tutors in the Scope Feedback condition also received Module 4, CATTS Scope Feedback (see Appendix J). This module described the display on the CATTS video monitor which would be observed during the actual lesson. It mentioned that the screen would display a moving bar graph that changed as the tutor questioned the pupil. The bar garph would also show the tutor which questions she/he had asked up to the moment of observing the screen, and the relationship between use of the six different questions to each other. Moreover, a number would appear in the upper right-hand corner which would indicate the percent of teacher questions up to the moment. The module presented three examples describing how the display "worked." In addition, the module indicated that an arrow would appear which would help the tutor complete the six-question hierarchy. Rules were given for movement of the arrow on the visual display. The tutor was told that the arrow would point to the cognitive category at which he/she should be questioning at that point in the lesson in order to move the arrow sequentially up the TPQR hierarchy. In addition, the printout described in Module 3-A provided a matrix which designated the "hits" or, times the tutor asked questions at the same level indicated by the arrow on the CATTS scope.

Video Feedback: Those seven tutors who were to have CATTS Delayed Video

Feedback after their lessons received Module 3-B--Interpretation of Printout Feedback (see Appendix K) before they received any feedback. Module 3-B was identical to Module 3-A which the Scope Feedback Group received, except that it gave no reference to the scope monitor or the matrix which described teacher questions by indicating question level (i.e., Matrix 1). Otherwise, the same printout and four practicum goals were described as in Module 3-A. The tutors in the Video Feedback Group were told that they would have the opportunity to view their lessons on videotape immediately following their lessons. Tutors in both the GATTS Scope and Video Feedback Groups also received, as part of Module 3-A or 3-B, a description and example of the graph they would next receive summarizing their baseline performance. This graph plotted the percent of high-level teacher questions and the percent of high-level pupil responses across each of the baseline trails (see Module 3-A and 3-B).

Supervisory Feedback: The seven tutors who were to obtain Supervisory Feedback received Module 1 (Appendix F), as did the other two feedback groups. However, they were only given the four teaching goals, and did not initially receive Module 3-B. It was not until they had taught four post-baseline lessons that they received Module 3-B. After the tutors in the GATTS Instantaneous Scope and Delayed Feedback Groups received and read their modules, they were provided with the graph which summarized their performance during baseline trails. As mentioned previously, these graphs showed (a) the percent ot high-level teacher questions over the total questions asked, and (b) the percent of high-level pupil responses over the total pupil responses. High-level teacher questions and responses included the Sequencing-Paraphrasing, Hierarchical Relating, Inference and Problem-Solving categories on the TPQR.

They were also instructed in procedures for using the printout information which they would receive after each lesson to evaluate their lessons and to graph the frequency of occurance of high-level teacher questions and pupil responses. The Supervisory Feedback Group received their baseline graphs only after they had completed their four lessons with supervisory feedback. Actual feedback for all trainees began on the next lesson following the last baseline trial.

Feedback Procedures: Beginning with each feedback lesson, a CATTS-TPQR Record was turned into the TEL for each session (See Appendix L). The purpose of the Coding Record was two-fold. First, it provided data for the TEL personnel to determine who was teaching at a certain time and the type of feedback they were to receive. Secondly, it contained most of the information necessary to construct the 12-bit word for the computer header card which was located in the computer at TEL. On this form the coder number was not included until the actual lesson time. Therefore, it was necessary for the TEL computer personnel to call the Observation-Coding Room to receive that number. This frequent contact between personnel at the TEL and the coordinators in the Observation-Coding Room at the Developmental Training Center provided the opportunity for close communication between those in the building where the observation took place, and those working in the TEL.

Trainees who received the CATTS Instantaneous Feedback always had a video monitor on the table in front of them which displayed the frequency of the six types of questions on the TPQR that the tutor asked at any moment during the lesson. The scope showed the relationship, in the form of a bar graph, between the use of the six different questions. Superimposed within each of the six bars on

the graph was the number of pupil responses at the same cognitive levels as the questions asked. The bar graph did not display pupil responses on a cognitive level different from that of the question asked, (see Figure 2 and Module 4, Appendix J.) As mentioned previously, the scope also showed--upper right-hand corner--the percent of teacher questions asked at any point in time during the lesson, and an arrow which showed the indicated question level. The moving arrow appeared under the abbreviations for the six question levels. The scope was in the tutor's view throughout the lesson and instantaneously portrayed changes in frequency of questions as they actually occurred during the lesson. The scope reflected the changes in questioning within one second after the observer coding the lesson pushed the "send" button on the button box, and sent the information into the PDP computer at the TEL. Hence, this group obtained instantaneous or immediate information on the criterion teaching behavior in situ while teaching. In addition, following their teaching, they received printouts summarizing their lessons, as did the Video Feedback Group and the Supervisory Feedback Group (after four feedback sessions). All trainees were required to continue to graph the percent of frequency for high-level questions and pupil responses after each printout was received. These data were recorded on the cumulative individual graph received earlier which had included the trainees' baseline percentages.

After each lesson in which feedback was involved, each tutor went to the TEL to pick up his/her printouts. The printouts were usually ready within 10 minutes after the lesson. Those trainees who received video feedback then viewed and heard their videotapes on a TV monitor in a room adjacent to the TEL. Their lessons had previously been videotaped by one of two videotape cameras which were installed in two of the three teaching stations. They were

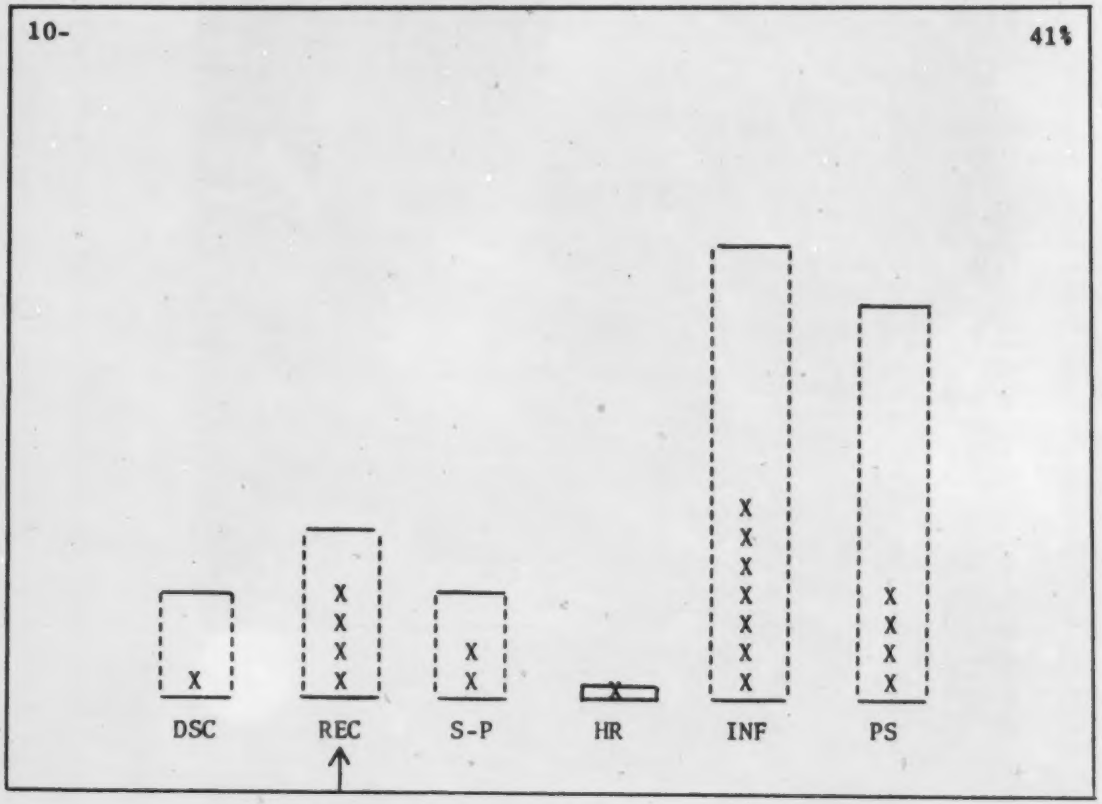

Figure 2. Bar graph displayed on video scope or screen showing six question categories for trainees receiving instantaneous visual feedback (See Module IV Appendix J)

told to focus on the four stated practicum objectives illustrated on the printout as they viewed the videotapes of their lessons. Those trainees who were given supervisory feedback received a subjective evaluation from one of the two project coordinators, who discussed lesson content and appropriateness in view of the same four practicum objectives. The two supervisors were also instructed to focus on any other teaching behaviors they considered relevant, and to answer any questions the tutor might have pertaining to his/her lesson. However, after their fourth feedback lesson, these seven tutors began to receive computer printouts from the TEL after each lesson, as did the two CATTS Feedback Groups. They were also required to graph the percent of high-level questions and high-level pupil responses from the lesson printout on their cumulative graphs. The total feedback phase of the project actually varied between nine and twelve lessons taught for each trainee.

Maintenance: Following the feedback phase of the project, all trainees entered a maintenance phase for their final two lessons. This phase was identical to the baseline phase in that trainees tutored their children without receiving feedback on their tutoring lessons. However, their reading lessons were again coded on the TPQR category system as they were during the baseline phase. During the total project period, each tutor had at least three lessons videotaped, including a baseline lesson immediately before feedback was begun, the last feedback lesson, and the last maintenance lesson after feedback was terminated. The total experimental design for each of the three teaching phases of the project is displayed in Figure 3.

FEEDBACK GROUPS	PROJECT PERIODS			
	P_1 BASELINE	P_2 FIRST TREATMENT	P_3 SECOND TREATMENT	P_4 MAINTENANCE
CATTS INSTANTANEOUS SCOPE FEEDBACK GROUP (N=7)	→ 9-14 Trials	→ 4 Trials	→ 5-8 Trials	→ 2 Trials
CATTS DELAYED VIDEO FEEDBACK GROUP (n=7)	→ 9-14 Trials	→ 4 Trials	→ 5-8 Trials	→ 2 Trials
SUPERVISORY FEEDBACK GROUP (N=7)	→ 9-14 Trials	→ 4 Trials	→ 5-8 Trials	→ 2 Trials

Figure 3. Experimental design for the four teaching periods of the project

Data Sources

The main source of data obtained during the project was the daily teacher-pupil observational data collected by the coders on the TPQR category-coding system. The CATTS system served as a data collection as well as a feedback mechanism. The system not only collected all daily observational data for the sessions coded, but also transferred the data to the university main computer center for permanent storage. Daily observational data were collected on several dependent measures including: (a) percent of teacher questions—defined as the number of questions the teacher asked divided by all teacher behavior; (b) percent of high-level teacher questions over the total questions asked; (c) percent of high-level pupil responses over total responses; (d) percent pupil no responses over total pupil responses given; and (e) percent of approximate matches which included the times the teacher asked any question in the TPQR hierarchy and the pupil responded at the same level. Additional data were collected from several other sources discussed below.

A fifteen-item questionnaire was given to the tutors at the end of their practicum (i.e., the first week in May). The questionnaire asked students to evaluate on a six-point scale their opinions concerning several aspects of the two-semester practicum (see Appendix Q). At the end of the practicum the project staff also interviewed each of the eleven pupils and asked them seven questions concerning their feeling towards their own tutor and the practicum itself (see Appendix R). In addition, all pupils were given posttests on the same six standardized reading and achievement tests given before the practicum began (see Appendix H). The final source of data was based on an evaluation of the three videotaped lessons taught by each trainee across the three teaching

phases of the project. The three videotaped lessons of each student included the last baseline lesson before feedback, the last feedback lesson, and the last maintenance lesson after the feedback phase of the project. The three lessons were rated using a sign observation system developed by Lynch and Everton (1976). The purpose of the evaluation of tapes on this particular system was to determine if there were any other concurrent effects of asking pupils higher-level questions. The system was designed to obtain measures of the amount of elaboration of the pupil's response and to determine if any qualitative changes took place over the duration of the tutoring experience. A copy of the system is shown in Appendix N. The evaluations of all three videotaped lessons of each tutor were done by two coders who had .98 reliability with each other. The results of the various sources of data collected during each teaching phase of the project are presented next.

CHAPTER FOUR

RESULTS & DISCUSSION

The design used to analyze the tutor observational data was a repeated measures ANOVA design with one between factor, Feedback Conditions or Groups ( ], and one within block factor, Periods (P). The original design contained a third possible factor – different variations of baseline and treatment trial combinations – but due to inconsistent tutor-pupil schedules and some missing observations, this baseline/treatment factor was never fully completed. Therefore, each tutor's trials were collapsed within the various baseline, treatment and maintenance periods, and one average-performance percent score per period was calculated. The percentages of frequency of the main dependent measures across each daily lesson were utilized in the analyses.

The first analysis was performed on the percent of teacher questions. As indicated previously, the criterion measure for the percent of teacher questions was defined as the number of questions the teacher asked during the lesson divided by all teacher behavior subsumed on the TPQR category system. Table 4 shows the average percent of teacher questions across each of the four teaching periods [i.e., baseline, (P_1), first treatment period (P_2), second treatment period (P_3), and maintenance (P_4)] for each of the three feedback groups [i.e., CATTS Video Feedback (G_1), Supervisory Feedback (G_2), and CATTS Scope Feedback (G_3)]. It should be recalled the first treatment period [i.e., (P_2)] represents tutor performance during the first <u>four</u> feedback trials following the baseline period. On the other hand, the second treatment period [i.e., (P_3)] represents tutor performance after the fourth feedback trial. This latter treatment phase varied between five and eight feedback lessons for individual tutors. The total treatment phase of the project ($P_2 + P_3$) varied between ten and twelve lessons.

Average Percent Performance

	P_1 Baseline	P_2 Treatment 1	P_3 Treatment 2	P_4 Maintenance
(G_1) CATTS DELAYED VIDEO FEEDBACK GROUP	88.75	50.33	40.37	49.50
(G_2) SUPERVISORY FEEDBACK GROUP	81.78	48.74	52.60	46.07
(G_3) CATTS INSTANTANEOUS SCOPE FEEDBACK GROUP	85.79	50.57	50.08	48.12
Total $\bar{X}$	85.44	49.88	47.69	47.90

Table 4. Average percent of teacher questions across each of the four teaching periods for each of the three feedback groups.

Table 5 contains the analysis of variance source table for percent of teacher questions. F ratios indicated a significant finding in the period (P) main effect ($p < .01$). An examination of the means in Table 4 reveals that mean percent teacher questions were significantly higher during baseline trials than treatment or maintenance trials. These results indicate that in general tutors initially dominated the tutoring lessons with teacher-controlled questioning during the baseline period. However, during treatment trials they were successful as a total group in reducing their mean percent of teacher questioning to 48.8%. As indicated previously, one of the major objectives stressed to each tutor was to keep the teacher questioning rate below 50% of all teacher verbal interactions. Hence, as a group the trainees were able to meet this criterion. Moreover, they were able to maintain this criterion during the maintenance period ($X = 47.9\%$). Table 5 further reveals a significant Feedback Group by Period interaction (GP) ($p < .05$). Due to this significant interaction, a simple main effects analysis (Kirk, 1968) was performed on G and P to qualify the main effects. The results of the simple effects analysis are also indicated in Table 5. Figure 3 illustrates the GP interaction plot. The results of this analysis revealed that the three feedback groups did not differ significantly ($p > .05$) during (a) baseline trials (P_1), (b) the first treatment period (P_2), or (c) the maintenance period (P_4). However, the groups did differ significantly during the second treatment period. To further clarify this significance, Tukey post hoc analyses (Winer, 1971) were performed on the means which are plotted on Figure 3. The results of the post hoc analyses indicated that the Video Feedback group asked significantly fewer questions ($p < .05$) during the second treatment period than the Supervisory Feedback Groups. On the other hand, there were no other significant group differences at any of the other

Table 5. Analysis of variance table for percent of teacher questions.

Source	SS	df	MS	F
Between Subjects	3499.57	20		
Groups (G)	35.22	2	17.61	< 1
Between G at P_1	171.53	2	85.77	< 1
Between G at P_2	13.87	2	6.94	< 1
Between G at P_3	583.22	2	291.61	3.36*
Between G at P_4	41.67	2	20.84	< 1
Within cell		72	86.78	
Subject with groups S (G)	3464.35	18	192.46	
Within Subjects	25123.98	63		
Periods (P)	21564.78	3	7188.26	139.42**
Between P at G_1	9694.64	3	3231.55	62.68**
Between P at G_2	5743.81	3	1914.60	37.13**
Between P at G_3	6901.25	3	2300.42	44.62**
GP	775.09	6	129.18	2.51*
P X subj. w groups SP (G)	2784.11	54	51.56	
Total	28623.55	83		

*$p < .05$
**$p < .01$

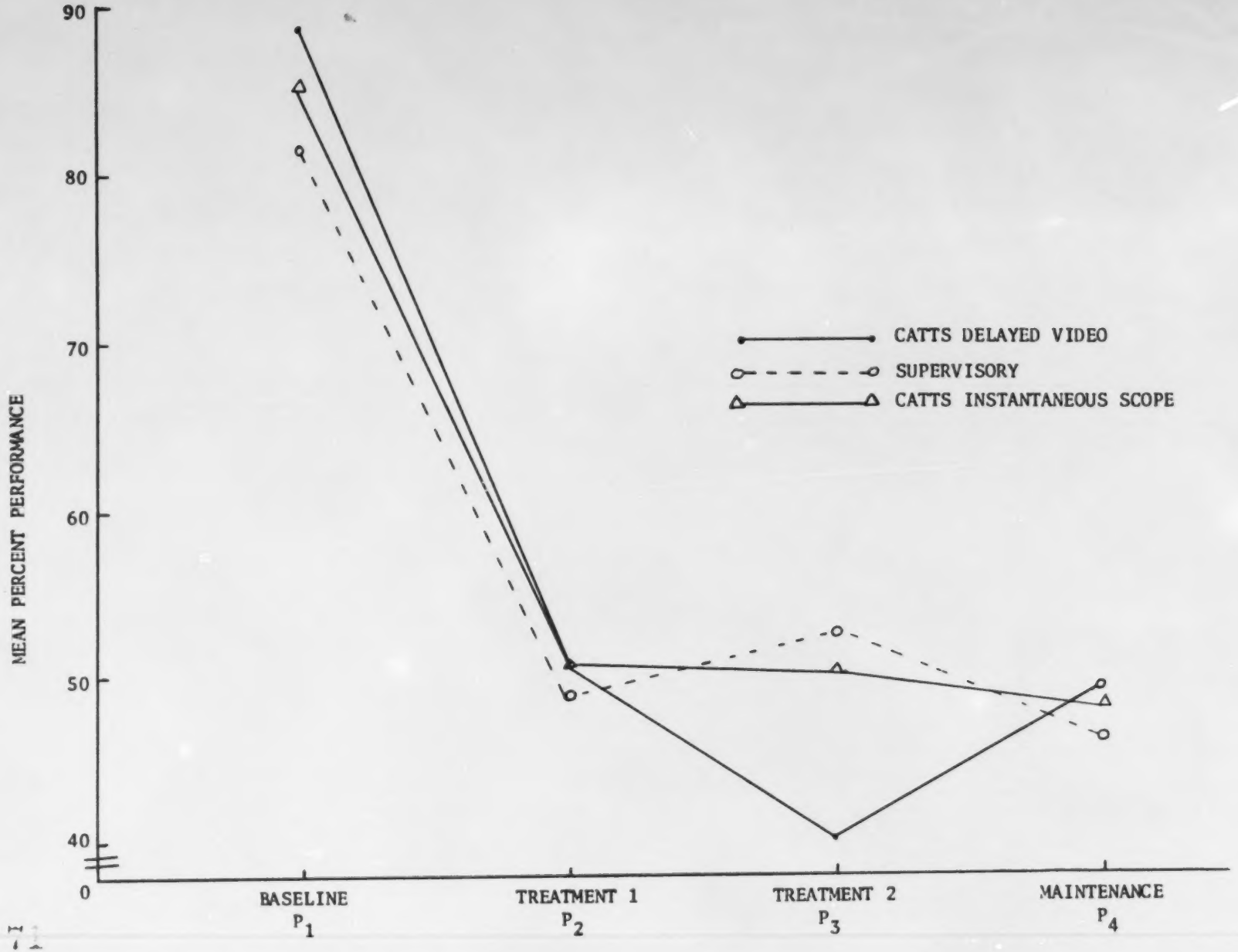

Figure 4. Mean percent of teacher questions across four teaching periods for each of the three feedback groups (GP interaction).

periods of the project. Nevertheless, all three feedback groups maintained their questioning performance at approximately the same level during the final maintenance period.

The results of the simple effects analysis also revealed several significant within-group comparisons for each feedback group across the various period. These significant comparisons were further analyzed using Tukey and Scheffe post hoc analytic procedures. For each feedback group, the Scheffe analyses revealed that each group significantly reduced their questioning performance between the baseline and the two treatment periods ($p < .01$). However, none of the within-group comparisons between the two treatment periods (P_2 & P_3) were significant ($p > .05$). Similarly, none of the within-group comparisons between the two treatment periods and the final maintenance period were significant ($p > .05$).

The second variable that analyses were performed on was the percent of high-level questions asked during each lesson over the total questions asked. It should be recalled that, during the feedback phase of the project, all trainees were asked to significantly increase their high-level teacher questioning over their mean baseline rate. Table 6 gives the mean percent of high-level teacher questions across each of four teaching periods for each of the three feedback groups. Table 7 contains the analyses of variance source table for percent of teacher high-level questions. F ratios indicated a significant finding in the period (P) main effects ($p < .01$). An exmaination of the means in Table 6 reveals that the mean percentage of high-level teacher questions was definitely higher during treatment and mainteance trails than during baseline trails. Tukey post hoc analyses of the (P) main effect further revealed that the three groups as a whole significantly increased their percentage of high-level questions between the baseline and initial

MEAN PERCENT PERFORMANCE

	P_1 BASELINE	P_2 TREATMENT 1	P_3 TREATMENT 2	P_4 MAINTENANCE
CATTS DELAYED VIDEO FEEDBACK GROUP (G_1)	14.97	31.57	42.22	38.79
SUPERVISORY FEEDBACK GROUP (G_2)	14.86	25.45	24.97	36.64
CATTS INSTANTANEOUS SCOPE FEEDBACK GROUP	17.07	29.50	31.12	29.71
Total $\overline{X}$	15.63	28.84	32.77	35.05

Table 6. Mean percent of high-level teacher questions across each of the four teaching periods for each of the three feedback groups.

Source	SS	df	MS	F
Between Subjects	4280.52	20		
Groups (G)	637.33	2	318.67	1.57
Subj. with groups S (G)	3643.19	18	202.40	
Within Subjects	10151.63	63		
Periods (P)	4746.46	3	1582.15	18.98**
GP	904.50	6	150.75	1.81
P X Subj. w groups SP (G)	4500.67	54	83.35	
Total	14432.15	83		

*p .05
**p .01

Table 7. Analysis of variance table for percent of teacher high-level questions.

treatment periods ($p < .01$). However, further increases between the two treatment periods and between the second treatment and maintenance periods were not significant ($p > .05$).

Table 7 also indicates that the main effects of periods were not qualified by a significant Groups by Period Interaction effect. Nevertheless, an analysis of the means in Table 6 suggests a trend towards greater increases in high-level questioning between baseline and treatment trials for the Video Feedback Group. The average proportional increase on Percent of High-Level Questions for the Video, Supervisory and Scope Feedback Groups between baseline and treatment periods were respectively; 110%, 71%, and 73%. The Supervisory Feedback Group revealed the lowest percentage of high-level questioning performance across the two treatment periods (P_2 & P_3). However, during the maintenance period, the Supervisory Feedback Group increased their mean percentage of high-level questions 47% relative to their percentage during the second treatment period. On the other hand, the other two feedback groups maintained their high-level questioning performance at a similar percentage demonstrated in the second treatment period.

The third variable that analysis was performed on was the percent of high-level pupil responses over the total responses given. As mentioned previously, all trainees were asked to significantly increase their high-level pupil responses to teacher questions over their mean baseline ratio. In fact, this criterion was emphasized as the most important goal in the project. Table 8 provides the mean percent of pupil high-level responses for each of three feedback groups across each of the four teaching periods. Table 9 contains the analysis of variance source table for percent of pupil high-level responses. F ratios indicated significant findings in the period (P) main effect (p .01) and in the Feedback Group by Period (G x P) inter-

MEAN PERCENT PERFORMANCE

	P_1 Baseline	P_2 Treatment 1	P_3 Treatment 2	P_4 Maintenance
CATTS DELAYED VIDEO FEEDBACK GROUP (G_1)	11.19	27.14	37.49	27.14
SUPERVISORY FEEDBACK GROUP (G_2)	10.78	19.43	18.52	26.07
CATTS INSTAN-TANEOUS SCOPE FEEDBACK GROUP (G_3)	11.02	23.81	26.44	24.60
Total $\bar{X}$	11.00	23.46	27.48	25.94

Table 8. Mean percent of pupil high-level responses across each of the four teaching periods for each of the three feedback groups.

Table 9. Analysis of variance table for percent of pupil high-level responses.

Source	SS	df	MS	F
Between Subjects	3962.09	20		
Groups (G)	704.50	2	352.25	1.95
Between G at P_1	0.59	2	0.30	<1
Between G at P_2	209.57	2	104.79	1.21
Between G at P_3	1270.42	2	635.21	7.31**
Between G at P_4	22.90	2	11.45	<1
Within Cell		72	86.85	
Subj. w. groups S (G)	3257.60	18	180.98	
Within Subjects	4642.84	63		
Periods	3544.29	3	1181.43	21.30**
Between P at G_1	2476.02	3	825.34	14.88**
Between P at G_2	823.55	3	274.52	4.95**
Between P at G_3	1043.70	3	347.90	6.27**
GP	798.97	6	133.16	2.40*
P X subj. w. groups SP (G)	2995.58	54	55.47	
Total	8604.93	83		

*$p < .05$
**$p < .01$

action effect ($p < .05$). An examination of the means in Table 8 reveals that the mean percent of pupil high-level responses was significantly higher during each of the treatment and maintenance periods than during the initial baseline period. In fact, the proportional gain in mean percentage of high-level responses between the baseline and first treatment period was 114%. Due to the significant Feedback Group by Period Interaction, a simple main effects analysis was performed on G and P to qualify the main effects. The results of the simple effects analysis are also indicated in Table 9. Figure 4 illustrates the GP interaction plot.

The results of this analysis revealed that the three feedback groups did not differ significantly during; (a) baseline trials (P_1), (b) the first treatment period (P_2), or (c) the maintenance period (P_4). However, the groups did differ significantly during the second treatment period. To further clarify this significance, Tukey post hoc analyses were performed on the means which are plotted in Figure 5. The results of the post hoc analyses indicated that the Video Feedback Group elicited a significantly greater mean percentage of pupil high-level responses during the second treatment period (P_3) when compared to the Scope Feedback Group ($p < .05$) and the Supervisory Feedback Group ($p < .01$). There were no significant differences during this same treatment period between the Scope and Supervisory Feedback Groups. However, a Scheffe post hoc analysis further revealed that the two CATTS Video and Scope Feedback Groups together elicited a significantly greater mean percentage of pupil high-level responses than the Supervisory Group.

The results of the simple effects analyses also revealed several significant within-group comparisons for each feedback group across the various

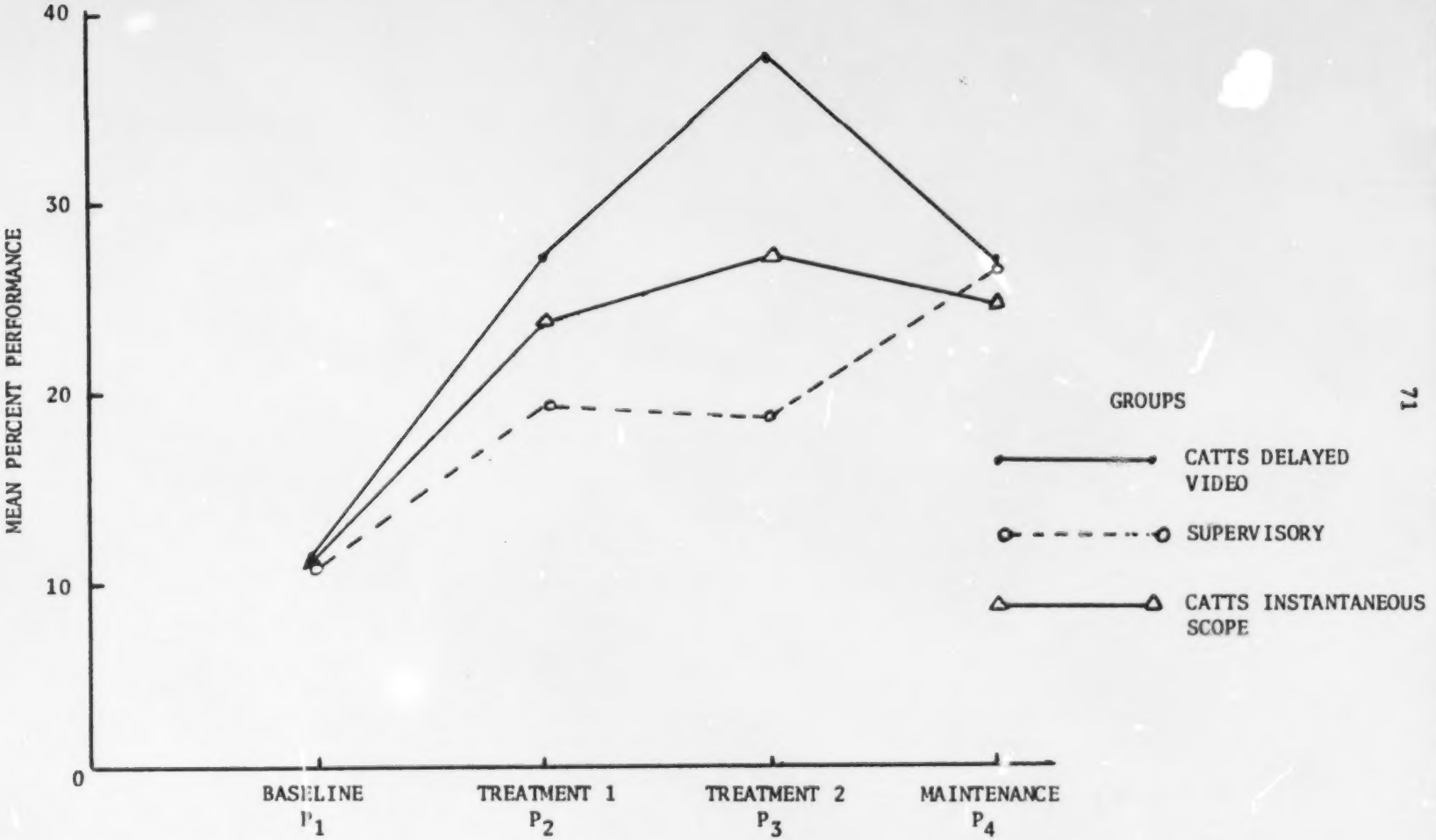

Figure 5. Mean percent of pupil high-level responses across four teaching periods for each of the three feedback groups (GP interaction).

period. The significant comparisons were further analyzed using Tukey and Scheffe post hoc analytic procedures. For the CATTS Scope and Video Feedback Groups, the analyses indicated that each group significantly increased their mean percentage of pupil high-level responses between baseline and the two treatment periods ($p < .01$). However, the increase in percentage of high-level responses for the Supervisory Group between baseline and each of the two treatment periods was not significant ($p > .05$). The analyses also revealed that none of the within-group comparisons between the two treatment periods (P_2 & P_3) for each of the three feedback groups were significant (p .05). Similarly, the within-group comparisons for each feedback group between the two treatment periods and the final maintenance period were all shown to be nonsignificant ($p > .05$).

A separate correlational analysis was also made between the previous two dependent variables for the total group of tutors. A Pearson correlation coefficient between percent of teacher high-level questions and high-level pupil responses was calculated across the total four periods for the total tutor sample. A value of $r = .944$ was found. Hence, the analysis indicated a strong positive relationship between high-level questions and pupil responses. In fact, the correlation was significant at the .001 level of significance.

The fourth variable that analysis was performed on was the percent of pupil no-responses to teacher questions asked during each lesson. Trainees in all conditions were asked to minimize as much as possible the failure of their pupils to respond to their questions. In particular, they were asked to significantly decrease pupil no-responses from their mean baseline rate. Table 10 provides the mean percent of pupil no-responses over total responses

MEAN PERCENT PERFORMANCE

	P_1 Baseline	P_2 Treatment 1	P_3 Treatment 2	P_4 Maintenance
CATTS DELAYED VIDEO FEEDBACK GROUP (G_1)	16.71	13.62	10.66	17.07
SUPERVISORY FEEDBACK GROUP (G_2)	19.70	22.00	18.92	19.43
CATTS INSTANTANEOUS SCOPE FEEDBACK GROUP (G_3)	20.30	14.55	13.79	9.71
Total $\overline{X}$	18.90	16.72	14.46	15.41

Table 10. Mean percent of pupil no-responses across the four teaching periods for each of the three feedback groups.

given. Table 11 contains the analysis of variance source table for percent of pupil no-responses. F rations indicated significant findings in the period (P) main effect ($p < .05$) and in the Feedback Group by Period (G x P) interaction effect ($p < .05$). An examination of the means the Table 10 reveals that the mean percent of pupil no-responses decreased approximately 17.5% between baseline and treatment periods. Due to the significant Feedback Group by Period interaction, a simple main effects analysis was performed on G and P to qualify the main effects. The results of the simple effects analysis are also indicated in Table 11. Figure 6 illustrates the GP interaction. The results of this analysis demonstrated that the three feedback groups did not differ significantly during the four periods of the project ($p > .05$). Moreover, the only significant within-group comparison across the various periods occurred within the CATTS Scope Feedback Group ($p < .01$). This significant simple effects analysis was further analyzed using Tukey and Scheffe post hoc analytic procedures. The analysis indicated that the CATTS Scope Feedback Group significantly reduced their mean percentage of pupil no-responses to teacher questions between baseline and the two treatment periods ($p < .05$). As indicated in Table 10, the CATTS Scope Feedback Group also reduced their mean percentage of pupil no-responses during the maintenance period, although the reduction was not significant ($p > .05$).

The final tutor variable that analysis was performed on was the percent appropriate matches, which included the times the tutor asked any questions in the TPQR hierarchy and the pupil responded at the same level. It was expected that there would be a significant relationship between the type and cognitive level of questions asked by the tutor, and the type and level of responses given by the pupils. It should be recalled that the previously

Table 11. Analysis of variance table for percent pupil no-responses to teacher questions

Source	SS	df	MS	F
Between Subjects	2923.87	20		
Groups (G)	556.85	2	278.42	1.72
Between G at P_1	51.75	2	25.88	<1
Between G at P_2	295.54	2	147.77	2.43
Between G at P_3	243.49	2	121.75	2.00
Between G at P_4	359.46	2	179.73	2.95
Within Cell		72	60.91	
Subj. w. groups S (G)	2906.26	18	161.46	
Within Subjects	8797.05	63		
Periods (P)	233.97	3	77.99	2.85*
Between P at G_1	189.21	3	63.07	2.30
Between P at G_2	39.10	3	19.55	<1
Between P at G_3	399.05	3	133.02	4.86**
GP	393.37	6	65.56	2.39*
P X subj. w. groups SP (G)	1479.61	54	27.40	
Total	11720.92	83		

*$p < .05$
**$p < .01$

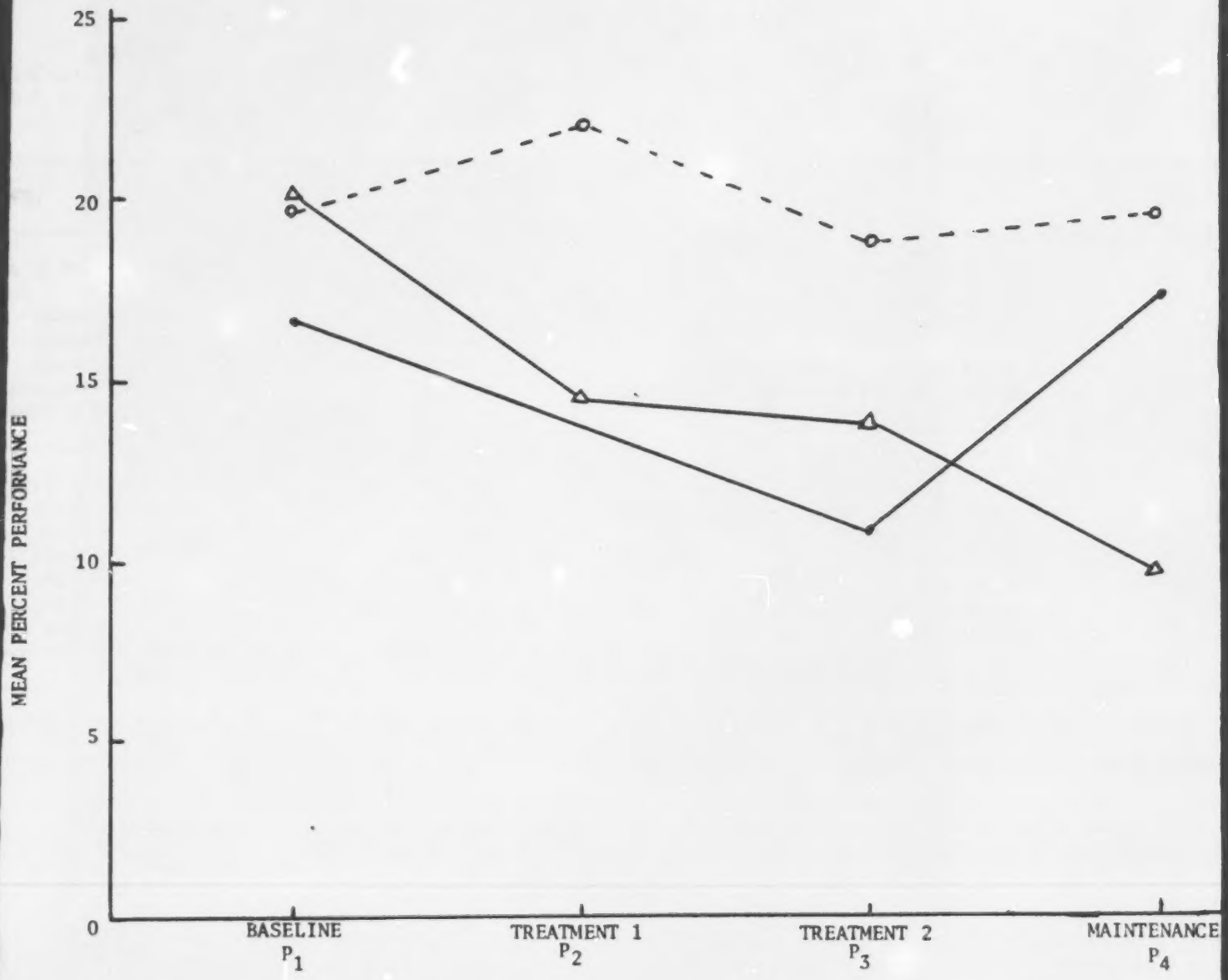

Figure 6. Mean percent of pupil no-responses across the four teaching periods for each of the three feedback groups (GP interaction).

described correlational analysis found a significantly high positive relationship between teacher high-level questions and pupil high-level responses ($r = .944$) for the total tutor sample across all teaching periods. Table 12 gives the mean percent of appropriate question-response matches across each of the four teaching periods for each of the three feedback groups. Table 13 contains the analyses of variance source table for percent of appropriate question-response matches. F ratios indicated no significant findings on the main or interaction effects ($p > .05$). This finding is not surprising when one examines the means in Table 12. As shown in Table 12, the percentage of appropriate question-response matches were at least 95% or better for each of the three feedback groups across each of the four periods. Hence, each group revealed a high degree of correspondence between the type and level of question asked and the type and level of pupil response. The lowest percent of appropriate question-response matches was revealed by the Supervisory Feedback Group during the first treatment period (i.e., 95.7% during P_2). A further correlational analysis for each feedback group across the four teaching periods verified the strong relationship between the cognitive level of the tutors question and the pupils response. Pearson correlation coefficients between high-level questions and pupil high-level responses across the 4 periods were respectively $r_{scope} = .955$, $r_{video} = .947$, $r_{supervisory} = .926$. All three correlation coefficients were significant at the .001 level.

As mentioned previously, in addition to the main source of daily teacher-pupil observational data collected during the project, data were also collected from several other sources. One source of data included a fifteen-item questionnaire given to the tutors at the end of their practicum (See Appendix Q.). This questionnaire asked the tutors to evaluate on a six-point

MEAN PERCENT PERFORMANCE

	P_1 Baseline	P_2 Treatment 1	P_3 Treatment 2	P_4 Maintenance
CATTS DELAYED FEEDBACK GROUP (G_1)	99.14	99.26	99.61	99.50
SUPERVISORY FEEDBACK GROUP (G_2)	98.86	95.72	98.49	98.50
CATTS INSTANTANEOUS SCOPE FEEDBACK GROUP (G_3)	96.81	99.43	99.64	99.00
Total $\bar{X}$	98.27	98.14	99.25	99.00

Table 12. Mean percent of appropriate question-response matches across the four teaching periods for each of the three feedback groups.

Source	SS	df	MS	F
Between Subjects	138.99	20		
Groups (G)	31.08	2	15.54	2.59
Subj. w. groups S (G)	107.91	18	6.00	
Within Subjects	503.78	63		
Periods (P)	18.65	3	6.22	<1
GP	62.73	6	10.45	1.34
P X Subj. w. groups SP (G)	422.40	54	7.82	
Total	642.77	83		

*p<.05
**p<.01

Table 13. Analysis of variance task for percent of appropriate question-response matches.

sclae their opinions concerning various aspects of the practicum experience. As indicated in Appendix Q, the following opinions were expressed. The questionnaire was completed by all of the 21 tutors in the project. As expected, 95% of the tutors found preparing lesson plans according to the format described previously as helpful in teaching their lessons. In addition, the special class teacher was seen as a valuable resource for the tutors in planning their lessons. All tutors were happy to receive feedback on their lessons. Approximately 43% of the tutors indicated that their particular form of feedback was most valuable. On the other hand, 24% of the tutors did not value their feedback and expressed a desire to have another type of feedback in addition to, or instead of the feedback they received. Many tutors expressed an interest in receiving both types of CATTS feedback modes. Of those receiving immediate Scope Feedback, only 24% felt the scope to be distracting during the lesson, whereas 38% disagreed with this opinion. The majority of the tutors (62%) revealed that they found that daily graphing of specific categories off their printouts during the treatment pahse helped them see trends in pupil performance. Only 10% of the tutors disagreed with this opinion. Of those tutors who received Supervisory Feedback, only 48% expressed that their feedback was useful.

One of the major criteria of the project was to increase amounts of higher-level teacher questioning over baseline rates. The teacher questionnaire revealed that the large majority (71%) of the tutors felt the criterion of asking high-level questions improved their lessons during the treatment phase of the project. Some of the usbjective comments expressed by the tutors in relationship to this criteria included the following: Asking more higher-order questions seemed to; (a) increase the length of reply to questions, (b) increase curiosity as measured by numbers of questions chil-

dren asked about substantive issues, (c) increase complexity of grammatical structures used...e.g. phrases and sentences used rather than isolated words; complex rather than simple sentences, (d) increase attention span and time spent in on-task behavior, and (e) increase longer and more involved explanations in response to questions. In general, the large majority of tutors (91%) indicated that the practicum experience increased their confidence as perspective teachers and, was a relevant learning experience for their teaching career (95%).

At the end of the project, the staff interviewed each of the eleven pupils and asked them questions concerning their feelings towards their own tutor and the practicum (see Appendix R). Results showed that all the pupils enjoyed their tutoring sessions and liked their tutors. In addition, all pupils were given posttests on the same six standardized reading and achievement tests given before the practicum began (see Appendix H). As indicated in Appendix H, the majority of pupils made significant gains in reading-related measures, particularly in reading comprehension. In the Survey of Primary Reading, the greatest gains were on the Sentence Comprehension and Story Comprehension subtasks. On the Wide Range Achievement Test, the average gain for the total group of 11 pupils on the reading subtest was 3.5 months (range 0 to 8 months). On the Gates-MacGintie reading test, the average gains on the Vocabulary and Comprehension subtests were 3.4 (range 0 to 9 months) and 2.6 (range 2 to 8 months) months respectively. The average gain on the Dolch 220 Word List, was 28.1 words (range 8-52) or 12.8%.

The next source of data was based on an evaluation of three videotaped lessons taught by each trainee across the three teaching phases of the project (baseline, treatment, maintenance). As mentioned previously, the three

videotaped lessons of each tutor included the last feedback lesson and the last maintenance lesson after the treatment or feedback phase of the project. The three lessons were rated using the sign observation system developed by Lynch and Everton (Appendix N). This system measures the amount of elaboration of the child's response to a teacher's question, and it was used to determine if any qualitative changes took place over the duration of the tutoring experience. The system contains eight categories. The frequency of pupil responses within each of the eight categories was calculated across the three lessons videotaped in each of the baseline, treatment and maintenance phases. The frequencies were then divided by the time (in minutes) within each lesson in order to get a measure of rate of pupil responses within each of the eight categories.

A repeated measures ANOVA design was used to analyze the pupil data. Each of the eight dependent measures on the sign system was analyzed using an ANOVA design with one between factor, Feedback Groups (G), and one within block factor, Periods (P). The rate of each of the eight dependent measures across each of the three videotaped lessons was utilized in the analysis. Of the eight ANOVA's calculated, only three revealed significant findings: (a) one word utterances, (b) sentence fragments, and (c) complex statements to teacher questions. All three ANOVA's involving these dependent measures indicated significant F ratios in the period (P) main effect ($p < .05$). None of the group (G) main effects or interactive (G x P) effects were significant ($p > .05$). The finding is not surprising when one considers the projects were randomized across the three treatment groups. Hence, some pupils were tutored by trainees who received different types of feedback. In addition, tutors did not teach standardized lessons during the three videotaped lessons. Hence, the lesson

content varied across tutors and was a possible source of confounding in terms of uniform group effects. Table 14 provides the mean rate of pupil performance data on each of the three dependent measures. Tukey post hoc analyses on the significant period means indicated that the eleven pupils as a total group significantly reduced their mean rate of one word utterances between the last trials of the baseline and treatment periods ($p < .05$). In addition, the pupil sample reduced their mean rate of sentence fragments (i.e., responses which were more than one word, but not a complete sentence) between the last trials of the treatment and maintenance periods ($p < .05$). On the other hand, the pupil sample increased their mean rate of complex statements between the last trials of the baseline and treatment periods ($p < .05$) and between the baseline and maintenance periods. Complex statements were defined in this context as the most complex and mature forms of oral expression which were recognized by the presence of dependent clauses that followed or sometimes preceded the main clause of a sentence. According to Lynch and Everton (1976), these sentences represented a qualification modification, or relationship, rather than just several ideas linked together as in compound statements or "strings." No other pupil effects were found to be significant.

The final source of data was based on a daily inspection of lesson printouts. This inspection revealed that, during the baseline period, tutors asked predominantely low-level questions. Of the two types of low-level questions on the TPQR observation system, discrimination questions were asked the most, while recall questions were asked the least. During the treatment phase, tutors in general asked questions from each of the six categories on the TPQR system. Of the four types of high-level questions, the order in frequency of usage of high-level questions from most to least

MEAN RATE PERFORMANCE

	MEAN RATE ONE WORD UTTERANCES			MEAN RATE SENTENCE FRAGMENTS			MEAN RATE COMPLEX STATEMENTS		
	BASELINE	TREATMENT	MAINTENANCE	BASELINE	TREATMENT	MAINTENANCE	BASELINE	TREATMENT	MAINTENANCE
CATTS DELAYED FEEDBACK GROUP (G_1)	0.164	0.078	0.152	0.195	0.158	0.153	0.005	0.017	0.014
SUPERVISORY FEEDBACK GROUP (G_2)	0.126	0.118	0.097	0.175	0.220	0.163	0.006	0.023	0.019
CATTS INSTANTANEOUS FEEDBACK GROUP (G_3)	0.171	0.117	0.125	0.207	0.203	0.142	0.007	0.013	0.013
TOTAL $\bar{X}$	0.154	0.104	0.125	0.192	0.194	0.153	0.006	0.017	0.015

Table 14. Mean rate of pupil performance on the three significant dependent measures of the sign system across each of the three teaching phases.

frequent was Sequencing/Paraphrasing, Inference, Hierarchically Relating and Problem Solving. A random sample of 25 lesson printouts from each of the three feedback groups during the treatment periods indicated that the CATTS Instantaneous Scope Feedback Group elicited the greatest variety of both high-and low-level questions and pupil responses in terms of percentages of questions asked and appropriate pupil responses. In addition, the Scope Feedback Group had the highest number of lesson profiles (18) where all six questions in the question hierarchical sequence were asked and appropriate responses were given. The CATTS Video and Supervisory Feedback Groups had 11 and 3 lesson profiles in their sample, where all six questions in the TPQR hierarchy occurred during the lesson. Hence, the CATTS Instantaneous Feedback Group was most successful in meeting the objective of progressing teacher questioning up the TPQR observation system hierarchy during the feedback phase of the project.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

Objectives: (1) To determine the effectiveness of a Computer-Assisted Teacher Training System (CATTS) as contrasted with verbal supervisory feedback in the development of critical reading and listening comprehension teaching strategies of pre service special education teacher trainees in a tutorial (laboratory) setting. (2) To test the effectiveness of reading comprehension instructional strategies developed out of a psycholinguistic view of the language process in use with retarded learners in a special classroom setting.

Perspective: The project described in the present paper attempted to relate the psycholinguistic processes of handicapped children to the training needs of special education teachers through the innovative application of CATTS technology in competency-based teacher training. The application of extensive research and inquiry into (a) a psycholinguistic approach to reading and language skills, (b) organizational language, and cognitive strategies of retarded and disadvantaged children, (c) specific instructional methods to facilitate reading of retarded and learning disabled children and (d) competency-based teacher education provided the theoretical framework for the present investigation. The Computer-Assisted Teacher Training System (CATTS) served as the prime vehicle for the discrimination, generation and evaluation of specific teaching strategies in reading comprehension by pre service special education trainees. The project built on previous developmental work involving CATTS at the Center for Innovation in Teaching the Handicapped, Indiana University.

Methods: In add, the study entailed five major phases: first, the development of a category observation-coding instrument which sequentially measured hierarchical teacher cognitive demands in the form of seven types of teacher

questions during reading and listening comprehension instruction; second, the training of coders on the observation system using a computerized consensus-coding system, DITRMA, and the attainment of reliable criterion intercoder and intracoder measures of observer agreement; third, baseline observations (nine to fourteen) of trainee hierarchical questioning behavior and pupil responses during tutoring lessons in a laboratory classroom setting; fourth, measurement of trainee questioning skills and pupil responses under three feedback conditions, (a) CATTS Instantaneous Scope Feedback, (b) CATTS Delayed Video Feedback, and (c) Supervisory Feedback; fifth, observations of trainee maintenance of hierarchical questioning behavior and pupil responses during tutor lessons without feedback.

In each of the three teaching phases 21 preservice trainees tutored eleven educable mentally retarded (EMR) children in reading instruction using diagnostic teaching lessons they had prepared. Trainees taught two 30-minute lessons with the same child each week. Coders were randomly assigned to teachers such that each teacher was observed by a different coder each time. Coders coded teacher-pupil interaction on botton boxes which were hooked up to a PDP-12 computer located in a separate building from the laboratory classroom.

In the baseline condition, trainees taught the lessons they had prepared without receiving feedback of any kind. The number of lessons taught during baseline varied from nine up to the first fourteen lessons taught. After their baseline trials were completed, the trainees were provided with a graph which summarized their high-level questions and pupil high-level responses over the baseline period. They received modules which described the Teacher-Pupil Question Response (TPQR) System and the CATTS System. The 21 trainees were then randomly assigned into the three feedback groups. Trainees assigned

to CATTS Instantaneous and Delayed Video Groups also received modules which described the interpretation of printout feedback they would receive with either the Scope or Video Feedback conditions. Once feedback lessons began, those trainees who had CATTS Scope or Video Feedback received computer printouts in addition to their feedback mode which summarized the teacher-pupil hierarchical questions and responses during the lessons. The trainees who had Supervisory Feedback received their first printout after their fourth supervised lesson.

Four major objectives were stressed to each tutor. They included: (a) increase amounts of higher-level teacher questioning, (b) increase amounts of appropriate pupil responses, (c) teacher questioning rate should be 30-50% of all teacher verbal interaction, and (d) progress teacher questioning up the TPQR observation system hierarchy. During the feedback phase, the bi-weekly lessons continued as during baseline and, in addition, all trainees received printouts on their latest lesson within 10 minutes after the lesson. The tutors evaluated the printouts in conjunction with the four basic goals for the practicum and graphed specific categories off their printout paper.

Those trainees receiving CATTS Scope Feedback always had a video monitor in front of them which displayed the frequency of occurrence of the six types of questions on the TPQR system that the teacher asked up to any given moment during the lesson, as well as the percent of teacher questions asked at any point in time during the lesson. The scope also displayed a moving arrow which showed the indicated cognitive level at which questioning was occurring.

Those trainees receiving Supervisory Feedback received subjective feedback based on the stated goals for the practicum in which both lesson content and appropriateness was discussed. After their fourth feedback trial, trainees received the printout feedback as well as supervisory evaluations. The total feedback phase of the project varied between ten and twelve lessons.

Following the feedback phase of the practicum, all trainees entered a maintenance phase for their final two or three lessons. This phase was identical to the baseline phase of the project in that trainees tutored their child without receiving feedback on their lessons. Each tutor had at least three lessons videotaped including a baseline lesson immediately before feedback was begun, the last feedback lesson, and the last maintenance lesson after feedback was terminated.

Data Sources: The main source of data for the project was based on the daily observational data on the TPQR category-coding system. Data was collected on several dependent measures including: (a) the percent of teacher questions, (b) the percent of high-level teacher questions over the total questions asked, (c) the percent of high-level pupil responses given, (d) the percent of pupil no responses over the total responses given, and (e) the percent of appropriate matches, which included the times the teacher asked any question in the APQR hierarchy and the pupil responded at the same level. Additional data were collected from the following sources: (a) a questionnaire given to the trainees at the end of their practicum, (b) an interview given to the EMR pupils, (c) pupil pre- and posttest results on several standardized reading tests and achievement tests, and (d) ratings of video-taped lessons on an objective rating scale to determine if there were any other concurrent qualitative linguistic effects of asking children high-level questions.

Results: In general, the results revealed that tutors made significant changes between the Baseline and Treatment periods and maintained their changes in questioning behavior during the Maintenance period. In addition, there were differential changes as a function of the type of feedback received. The first dependent variable analyzed was the percent of teacher questions during each lesson. The results indicated that tutors in each group achieved

the objective of keeping their questioning rate between 30-50% of all their verbal interaction once they received feedback. Before receiving feedback, the tutors dominated the interactions, with teacher questions averaging 85% of teacher behavior. However, as soon as the tutors began to receive feedback during the treatment lessons, they managed, as a group, to significantly reduce their questioning rate to 49.9% during the four feedback trials of the first treatment phase and to 47.7% during the second Treatment phase, which varied between six and eight lessons. Moreover, the total tutor sample maintained their questioning rate during the maintenance or no-feedback phase at 47.9%.

The results further indicated that, although the three groups did not differ significantly during baseline, maintenance and the first treatment period, they did differ significantly during the second and longer treatment period. It could be argued that a few feedback trials are required before a particular feedback mode makes its most powerful impact in terms of modifying pre service teacher behavior. At any rate, the analyses revealed that the CATTS Delayed Video Feedback Group did not differ from the CATTS Instantaneous Scope Feedback Group during the second treatment phase, but did differ significantly in their mean percent of total teacher questions from the Supervisory Feedback Group. It should be recalled that all three feedback groups received objective printouts which summarized their interactions on the TPQR category system. Hence, the Delayed Video Feedback Group was more effective than the Supervisory Feedback Group during the Second treatment period. On the other hand, the superiority in terms of total questions asked did not carryover into the maintenance phase. Perhaps if the second treatment phase had been extended, the superiority would have generalized into the maintenance phase.

The second dependent variable analyzed was the percent of teacher high-level questions over the total questions asked during each lesson. The results indicated that tutors in all groups achieved the objective of significantly increasing their percentage of teacher high-level questions as measured by the TPQR observation system between the baseline and initial treatment periods. Moreover, this proportional increase in percentage of high-level question (84.5%) increased and carried over into the maintenance period. The mean percentage of teacher high-level questions across the four successive teaching periods was 15.6%, 28.8%, and 35.1%. The results further revealed a trend toward greater mean increases in high-level questioning between baseline and treatment periods for the CATTS Delayed Video feedback group. On the other hand, the Supervisory Feedback Group demonstrated the lowest percentage of high-level questioning across the two treatment periods (25.5% and 25.0%).

The third major dependent variable analyzed was the percent of pupil high-level responses over the total pupil responses to teacher questions during each lesson. The results indicated that tutors in all groups again achieved the critical objective of significantly increasing their percentage of pupil high-level responses as measured by the TPQR observation system between the baseline and treatment periods. In addition, this proportional increase in percentage of high-level pupil response (114%) increased in the second treatment period and carried over in the maintenance period. The mean percentage of high-level responses across the four successive teaching periods was 11.0%, 23.5%, 27.5%, 26.0%. The results further indicated that, although the three groups did not differ significantly during baseline, maintenance and the first treatment period, they did differ significantly during the second and longer treatment period in terms of the rate of pupil high-level responses.

The analyses revealed that the CATTS Delayed Video Feedback Group elicited a significantly greater mean percentage of pupil high-level responses (37.5%) during the second treatment period when compared to the CATTS Instantaneous Scope (26.4%) and Supervisory (18.5% Feedback Groups. The difference during the same treatment period between the two latter feedback groups was not significant. However, further analyses revealed that the CATTS Video and Scope Feedback Groups together elicited a significantly greater mean percentage of pupil high-level responses than the Supervisory Feedback Group. For the CATTS Video and Scope Feedback Groups the analyses also showed that each group significantly increased their mean percentage of pupil high-level responses between baseline and the two treatment periods. However, the increase in percentage of high-level responses for the Supervisory Feedback Group between baseline and each of the two treatment periods was not significant. It appears that the addition of objective printouts, which summarized teacher-pupil question-response interactions on the TPQR observation system, did not add significantly to the subjective feedback provided by the project graduate supervisors. On the other hand, the initial significant effect of objective feedback, either instantaneous or delayed, carried over into the second and longer treatment period. It is noteworthy that all three feedback groups demonstrated no further significant changes during the maintenance period when feedback was removed. Hence, the effects that were developed during the treatment periods generalized into the final maintenance period for each feedback group.

It should also be noted that daily inspection of the lesson printouts revealed that tutors in general asked questions from each of the six categories on the TPQR observation system. Of the four types of high-level questions on

the system, the order in frequency of usage of high-level questions from most to least frequent was Sequencing/Paraphrasing, Inference, Hierarchically Relating and Problem Solving. Of the two types of low-level questions on the TPQR system, Discrimination questions were asked the most, while Recall questions were asked the least. A random sample of 25 lesson printouts from each of the three groups during the treatment periods of the project indicated that the CATTS Instantaneous Scope Feedback Group elicited the greatest variety of both high-and low-level questions and pupil responses in terms of percentages of questions asked and pupil responses. In addition, the Scope Feedback Group had the highest number of lesson profiles where all six questions in the TPQR hierarchical sequence were asked and appropriate responses were given. On the other hand, the Supervisory Feedback Group had the least variety of both high-and low-level questions and pupil responses, and the least number of lesson profiles where all six questions in the TPQR hierarchy were completed in sequence. Hence, the CATTS Instantaneous Feedback Group was most successful in meeting the objective of progressing teacher questioning up the TPQR observation system hierarchy. This finding is not surprising when one considers that this group always had a video monitor in front of them which displayed the frequency of the six types of questions on the TPQR system in terms of a bar graph as well as a moving arrow which showed the indicated cognitive level at which questioning was occurring. The CATTS Delayed Video Feedback Group was able to immediately replay their lessons on videotape following their lessons. Together with the printout, this experience allowed them to refresh their memories and visually process the information on the printouts. On the other hand, the Supervisory Feedback Group had to rely on their supervisor's or their own long term memories in order to recall the sequence of questions asked during the

lesson, particularly during the initial four trails of the first treatment period when they did not receive any objective summary printouts.

The fourth dependent variable analyzed was the percent of pupil no-responses to teacher questions asked during each lesson. The results revealed that the mean percent of pupil no-responses decreased slightly (approximately 17.5%) between baseline and treatment periods. The mean percentage of pupil no-responses across the four successive teaching periods was 18.9%, 16.7%, 14.5%, and 15.4%. However, the three feedback groups did not differ significantly during the four periods of the project. The CATTS Instantaneous Scope Group was the only feedback group who significantly reduced their mean percentage of pupil no-responses to teacher questions between baseline and the two treatment periods. Infact, there was a general trend for the Scope Group to gradually decrease their percentage of pupil no-responses into the maintenance period. The Supervisory Feedback Group elicited the highest percentage of pupil no-responses during the treatment and maintenance periods.

The fifth major dependent variable analyzed was the percent of appropriate question-response matches. This variable included the times the tutor asked any question in the TPQR hierarchy and the pupil responded at the same cognitive level. In general, the results showed that there was an extremely high relationship between the type and cognitive level of questions asked by teachers and the type and level of responses given by the pupils. In fact, the mean percentagessof appropriate question-response matches across each of the four teaching periods were respectively 98.2%, 98.1%, 99.3% and 99%. Moreover, the percentage of appropriate matches was at least 95% or better for each of the three feedback groups across each of the four periods. The lowest

percent of appropriate matches was revealed by the Supervisory Feedback Group during the first treatment period (i.e., 95.7%. A correlational analysis also revealed a significantly high positive relationship (r = .944) between the percent of teacher high-level questions and pupil high-level responses for the total tutor sample across all four teaching periods. The percent of appropriate matches further verifies the strong relationships between the type and level of teacher questions and pupil responses.

Another source of data included a questionnaire which asked tutors to evaluate their opinions of the practicum experience. The majority of tutors indicated that the practicum experience increased their confidence and was a relevant learning experience. All tutors were happy to receive feedback on their lessons, and approximately on-half indicated that their particular form of feedback and the daily printouts were most valuable. The majority of tutors also found that daily graphing on the CATTS feedback condition of specific categories off their printouts helped them to see trends in pupil performance. Of those receiving Instantaneous Scope Feedback, less than one-quarter felt the scope to be distracting during the lesson. Of those tutors who received Supervisory Feedback, less than on-half expressed that their feedback was useful. The majority of tutors indicated that the criterion of maximizing high-level questions improved their lessons during the treatment periods. The tutors said that they observed several concurrent effects as they began to ask more higher-order questions. Asking more higher-order questions resulted in an increase in the length of reply to questions; an increase in curiosity as measured by number of questions children asked about substantive issues; an increase in complexity of grammatical structures used; an increase

in attention span and time spent in on-task behavior; and longer and more involved explanations in response to questions. Several of the tutors indicated that they were surprised and happy to see that their handicapped pupil was capable of responding appropriately to high-level questions. Further research is required to document more specifically the possible concurrent effects of asking mildly handicapped children higher-order questions, as well as the relationships among those concurrent effects. The specific content of the pupil's response should be investigated in terms of its semantic and syntactic components as well as a concept analysis of the pupils responses in terms of the content and the instructional task.

In relationship to the eleven pupils in the project, results showed that all pupils enjoyed their tutoring sessions and liked their tutors. The majority of pupils made significant gains in reading-related standardized measures over the course of the project, particularly in reading comprehension and sight vocabulary. A final source of data was based on an evaluation of three videotaped lessons obtained during each tutor's last baseline, treatment and maintenance lessons. The lessons were rated using a sign observation system which measured the amount of elaboration of the pupil's response to a teacher's question. The rate of pupil responses within each of eight categories on the sign system was calculated. Results indicated that the total pupil sample significantly reduced their mean rate of one-word utterances and sentence fragments between the last trials of the baseline and treatment periods. Moreover, the pupil sample increased their mean rate of complex statements between the last trails of the baseline and treatment periods and transfered this gain into the maintenance periods. Between feedback groups, comparisons were not significant on these same three pupil

variables. However, this finding is not surprising since the effect of feedback groups is confounded by the fact that pupils were randomized across treatment groups. As a result, some pupils were tutored by trainees who received different types of feedback.

Conclusions:

In conclusion, the present project has demonstrated the efficacy of CATTS Instantaneous Scope and Delayed Printout and Video Feedback as well as Supervisory Feedback in generating specific teacher behaviors in a pre service laboratory teaching setting. The project realized the stated objective of training critical patterns of teacher-pupil question-response interaction in reading and listening comprehension instruction with the aid of CATTS. The project also showed the feasibility of implementing the CATTS system with preservice trainees as part of their preservice teacher training program in special education. More specifically, the project demonstrated the relative effectiveness of CATTS Instantaneous and Delayed Feedback with supervisor verbal feedback in a laboratory tutorial classroom setting. In essence, the two CATTS feedback groups and in particular the CATTS Delayed Feedback Group performed most effectively during the project. In summary, the Delayed Video Feedback Group was more effective than the Supervisory feedback in keeping their questioning rate below 50% of all verbal interaction during the treatment phase of the project. There were no differences between the two CATTS feedback groups or between the CATTS Instantaneous Scope and Supervisory Feedback Groups in relation to this particular dependent variable. Although the differences were not significant, there was a definite trend toward greater mean increases in high-level questioning between baseline and treatment periods for the CATTS Delayed Video Group. On the other hand, the Supervisory Feedback Group demonstrated the lowest percentage of high-level questioning across the treatment periods of the project.

The most important finding was based on the percent pupil high-level responses to teacher questions during each lesson. The results demonstrated the superiority of the CATTS Delayed Video Feedback Group in eliciting pupil high-level responses during the second treatment period over both the CATTS Instantaneous and Supervisory Feedback Groups. Again, the differences between the CATTS Instantaneous Scope and Supervisory Feedback Group were not significant. However, the combined effects of the two CATTS feedback groups was superior to the Supervisory Feedback effect in eliciting a greater percentage of pupil high-level responses to teacher questions. Moreover, the Supervisory Feedback Group, unlike the two CATTS groups, was unable to increase the percentage of high-level responses between baseline and both treatment periods. Even the addition of objective printout feedback did not significantly effect the rate of pupil high-level responses for the Supervisory Feedback Group. For all feedback groups, any effects developed during Treatment periods generalized into the final no-feedback maintenance period. Of the three feedback groups, the CATTS Instantaneous Feedback Group elicited the greatest variety of both high-and low-level questions asked and pupil responses given across a sample of treatment lessons, and the highest number of lesson profiles where all six questions in the Teacher-Pupil Question-Response category system were asked and appropriate responses were given during the lesson. On the other hand, the Supervisory Feedback Group elicited the least variety of both high-and low-level questions and pupil responses, and were least successful in meeting the objective of progressing teacher questioning up the TPQR observation system hierarchy.

The CATTS Instantaneous Scope Group was the only group who significantly reduced the mean percentage of pupil no-responses to teacher questions between baseline and the two treatment periods. On the other hand, there

was a trend for the Supervisory Feedback Group to elicit the highest percentage of pupil no-responses across the treatment and maintenance periods. The lowest percentage of appropriate matches between the type and cognitive level of questions asked and responses emitted were also elicited by the Supervisory Feedback Group. Subjective tutor ratings indicated that trainees in the Supervisory Feedback Group were least satisfied with their form of feedback.

Based on the results, it may be generally concluded that the CATTS Delayed Feedback Group was most effective in modifying teacher and pupil interactive question-response performance. Although the differences were not significant, there was a trend for the CATTS Instantaneous Scope Feedback Group to be more effective than the Supervisory Feedback Group in terms of their teacher-pupil question-response performance data. Furthermore, the combined effects of the two CATTS feedback modes were generally more effective in modifying teacher-pupil performance than the effects of Supervisory Feedback alone. Future research should investigate the relative teaching performance of trainees who receive both CATTS Scope and Delayed Video Feedback compared to trainees who receive only one form of CATTS feedback in the development of critical reading and listening comprehension teaching strategies. IN addition, the comparative effects of delayed CATTS Delayed Video Feedback with computer printouts should be investigated. Based on the findings in this project, it is difficult to determine if the superior effects of CATTS Delayed Video Feedback were due to the opportunity of trainees to replay their lessons on videotape, or to the combined effects of videotape review and objective printout feedback.

The project was also successful in developing a reliable observation-coding instrument for use in training preservice teachers in special education to discriminate among, generate and evaluate specific teaching behaviors and patterns related to reading and listening comprehension instruction. The use of this instrument in other content-related instruction should be investigated. As mentioned previously, further research is required to document more specifically concurrent effects of asking mildly handicapped children high-level questions across specific lesson content. The present project has described a preservice application of CATTS, and has demonstrated and supported the efficiency and efficacy of instantaneous and delayed CATTS feedback for training critical patterns of teacher interaction in reading and listening comprehension instruction in a controlled laboratory setting. Yet to be determined are the efficacy of the system and its uniqueness in training special and regular education preservice and inservice teachers to generate effective reading and listening comprehension teaching strategies in naturalistic classroom settings. In addition, the cost-effectiveness of CATTS as a training vehicle, in comparison to traditional preservice and inservice teacher training techniques in naturalistic classroom settings, is yet to be determined. In essence, CATTS is a versatile and comprehensive delivery system which can be applied in many ways within the field of teacher education. With creative applications, the system can be of great assistance in the accomplishment of training objectives for competency-or performance-based training programs in special and regular teacher education.

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APPENDICES

APPENDIX

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APPENDIX A

Coder Training Tapes

I

T: "What's in this picture?"

St: "A boy and a girl."

St: "In what year did John Kennedy die?"

T: "I don't know."

T: "Put all the pictures of tools in one pile and all pictures of materials in another."

St: (Does so.)

St: "Can you guess what happens at the next page?"

T: "The boy falls down."

St: "What would happen if you left the meat on the table and the dog was loose in the room?"

T: "Dog would eat the meat."

T: "Can you explain how this letter is different from the other?"

St: "They're different."

T: "Does your mother use baking powder in her cake?"

St: "Yes."

T: "Tell me the story from the beginning to the end."

St: (Does so.)

St: "What would happen if it would snow for two weeks in a row?"

T: "We won't be able to go outside."

T: "Are these two letters the same?"

St: "This is a p and the other is a q."

St: "Do you think that the boy in the story chose the best way to solve his problem?"

T: "Yes."

T: "If you were lost in a big department story, what would you do?"

St: "Look for a policeman."

T: "What is this letter?"

St: "B."

T: "What does the sentence on the flashcard say?"

St: (Does so.)

St: "Did the boy lose his hat or did someone take it?"

T: "He lost his hat."

St: "What would have happened if he'd attached the wheels to the car with a bolt?"

T: "They would fall off."

St: "How would you fix a soapbox?"

T: "I'll take wood, hammer, etc."

T: "What could you do to help a friend having trouble with her school work?"

St: "If you have trouble with your schoolwork you get bad marks."

T: "Would you rather write a story or read one?"

St: "Read one."

St: "What happened after the girl in the story had a fight with her friend?"

T: "I once had a fight with my best friend."

T: "How many letters in this word?"

St: "Three."

T: "Tell me the story in your own words."

St: (No response.)

Child begins throwing pencils.

St: "What does happiness mean?"

T: "Feeling groovy."

T: "How many lines does this letter 'A' have?"

St: "Three."

St: "Can you think of other ways to ear money?"

T: (Does so.)

T: Read the sentence on this flash card.

St: (Child reads.)

St: "I'm going to a baseball game tonight."

T: "So, big deal."

T: "Tell me what happened before Johnny began fighting with Sue."

St: (Does so.)

T: "Can you think of one word to describe all of the following: apple, orange, fig, pear, banana?"

St: "I bought some of those at the store yesterday."

T: "Which color crayon do you want to use?"

St: "Blue."

T: "Can you put these sentences in order to tell a story."

St: "I can't."

T: "Do you have to use the bathroom?"

St: Child gets up and leaves.

T: "Read this word."

St: "Gee, the weather is nice."

St: "Who won the race?"

T: "Joe."

T: "Put all animals which fly in one pile and those that swim in another."

St: Does so.

St: "Have you ever used a hammer?"

T: "Yes."

St: "What would you do if the chain of the swing broke?"

T: "Fix it by bolting it together."

S:: "What do you think would happen if a little boy would try to drive a car?"

T: "He would crash into a tree and smash it all up."

II

T: How are you today?
St: I guess all right.

T: Let's start with this story--you read the first paragraph.
St: (Does so.)

T: What does the paragraph say?
St: (Does so.)

St: Can you imagine what happens next?
T: (Does so.)

T: What do you see in this picture?
St: (Answers.)

T: Now, would you like to read the rest by yourself, or would you like to read it out loud?
St: I'll read it by myself.

St: How would you fix a flat tire?
T: Patch it with liquid rubber.

St: What is Halloween?
T: It's a holiday and you dress up in costumes.

St: What happened to the old lady in the story?
T: She broke her back.

T: Explain to me everything that happened before the boy attacked the girl.
St: The girl called him names.

T: How can we prevent a fire from starting in the house?
St: Don't overload electrical wires.

St: Why do you think the plane crashed?
T: It must have run out of gas.

St: What would happen if rugs were made out of ice?
T: Everyone would get cold feet and slip.

T: Look at this word, how many letters are there?
St: Three.

T: Look at the ceiling; is it the same color as the picture in the book?
St: I don't know.

St: What does the word solvent mean?
T: I don't know.

St: Can you think of one way to get out of a locked room?
T: Well, you could scream for help.

St: How many eyes does the monster have in this picture?
T: Sixteen.

St: Why are cars and busses alike?
T: Because they both are used for transportation.

T: What would happen if a tree fell in the street?
St: It would block traffic.

T: There are 5 pictures. Can you put them in order so they tell a story?
St: (Does so.)

St: Where did the girl in the story go?
T: I'm going on a trip tomorrow! We are going sailing!

T: What is this letter?
St: A "L".

St: Who entered the big castle the very last?
T: I think it was the robber.

T: Who found the treasure first?
St: Mary found it first, and right after her John found the right place.

T: How are these letters alike?
St: They are different.

T: What is this letter?
St: a "Q".

Student falls asleep.

St: What happened to the mother in the story?
T: She became sick--my mother was sick last week.

St: What happened to the children after the mother went to the hospital?
T: When my mother went to the hospital, we stayed with my uncle.

St: How would you get that kite out of that tree?
T: My kite was in a tree once.

T: How would you get that kite out of that tree?
St: If you fly your kite when it is very windy it could get stuck in a tree.

T: How would you get that kite out of that tree?
St: I'll borrow a ladder, climb up, and very carefully put the kite loose, because if I would tear it, I could not use it anymore.

St: How would you find your way home if you were lost?
T: I'd look for a policeman.

St: How is a coat and a dress alike?
T: They're both made of cloth.

T: Did you like the lesson?
St: I'm going home.

APPENDIX B

Additional Verbal Exercises for Observer Training on the TPQR Category System

T: What would you drink if you were stranded on a desert island?
St: Sea water.
T: Sea water drys out your cells, what else would you try?
St: I don't know, what would you do?
T: I'd eat leaves, roots and fruits.

T: Have you ever build a soap box car like the one in the story?
St: I built a treehouse once.

St: What was the first thing you did this morning?
T: Brushed my teeth.

T: What will happen if I put the paper into the fire?
St: The paper will burn and you will get ashes.

St: How do you spell dog?
T: D-O-G

T: What would you do if you got lost coming home from school?
St: I would look for a policeman.

St: What do tigers look like?
T: They are big yellow cats with black stripes.

T: Can you put these pictures in order so that they tell a story.
St: This pictures comes first because the girl is getting out of bed; after that she puts on her shoes.

T: What makes bread rise?
St: I think my mother uses yeast.

T: How are cats and dogs different?
St: Cats meow and dogs bark.

T: What would happen if it snowed for two months?
St: We would make snowmen.

St: Is this an "A" or a "C"?
T: An "A".

T: What would you do if your friend fell down the stairs and got hurt?
St: I'd call a doctor.

T: Did the boy in the story go to school or play hookey?
St: Play hookey.

T: What happened first in the story?
St: The dragon was crying.

St: Why does it rain?
T: Because water builds up in the clouds until they can't hold it anymore.

T: Why do you think Sam hit John?
St: John stole Sam's truck.

St: How are these letters alike (T, I)?
T: Both have one vertical line.

T: Are these two letters different?
St: No they are both T's.

St: What color is my pencil?
T: Yellow.

T: What would you do if your pencil broke during a test?
St: Ask my neighbor for one.

St: Did you like school when you were in the first grade?
T: No.

St: How would you start a fire without matches?
T: Rub two sticks together.

T: Where do snakes live?
St: In the ground.

St: Put these pictures in order so they tell a story.
T: (Does so.)

T: What do you think Joan will do with her soapbox car after she is finished with it?
St: Maybe she'll give it to me.

St: How would you find out what to feed a unicorn?
T: I'd look it up in the encyclopedia under unicorn.

T: What will her mother say when she finds out Susie can read the "dog book"?
St: She will say she is proud of Susie.

T: Can you tell me a story about this picture?
St: Once upon a time there was a little girl who lived in a castle and she was unhappy because she had no one to play with.

St: How do you get to your house?
T: Go over the river and through the woods and its the fourth treehouse on the left.

St: What will happen if Carol doesn't go to school today?
T: I will mark her absent and she will miss the new lesson.

T: Summarize the story you just read.
St: The story is about John, who lost his hat on the way to school and had to find a way to get a new one.

St: How is television different from radio?
T: Television has a picture and radio doesn't.

T: Which of these words is carrot?
St: That one.

St: Put all the A's in one pile and all the Z's in another.
T: (Does so.)

St: What would you do if the lights went out in your house?
T: Look for candles and matches.

T: How are horses, cows, dogs, cats and whales alike?
St: I don't know
T: They are mammals.
St: What are mammals?
T: Warm blooded animals that bear live babies.

St: Why do you think your car didn't start this morning?
T: I think the battery is dead.

T: In the story did the lion and the tiger fight?
St: No, they were just playing.

T: I am going to say a word and you tell me the names of the first 2 letters.
"Cat"
St: C-A

St: What was the name of the girl in the story we read last week?
T: Susie.

T: What letter is this? (pointing to a letter)
St: C

APPENDIX C

Criterion Tape for Evaluating Observer Agreement on the TPQR System

T: How are you today?
St: I am fine.

T: Let's continue our story of yesterday. Do you remember what the story was about? (Recall intonation).
St: About a girl who asks a lot of questions.

T: How did the story start?
St: The girl took a ride with her family and started asking all kinds of questions about what she saw. She asked about the houses, the people, then they. . .

St: Why do you think she would ask so many questions?
T: Well, I think people ask questions because they see things they don't quite understand and they want to find out.

St: Teacher, can you guess what happens on the next page?
T: I think that the girl might to into the class and start asking questions to the students and the professor.

St: What would you do if a little girl comes into your class asking everyone questions?
T: I would make a place for her and let her ask questions!

St: How do you spell the word "question"?
T: q u e s t i o n

St: What is this word here?
T: "professor"

T: We just talked about what a university is--a place where people go to study things. Can you now guess what a professor means?
St: Probably a teacher, like you are.

T: Very good, very good.

St: What is this in this picture?
T: A dog, yes, a dog.

T: Can you think of a reason why there would be a dog in this story?
St: (Shrugs shoulder--no response).

T: What do you think the people in this picture are doing?
St: They are students listening to the teacher.

St: Hm, I see. I guess you are right. Do you remember whether the girl had a brother or sister?
T: I believe the story said she had a brother and a sister.

St: Do you remember the name of the brother and the sister?
T: If they had only 3 children then a small car, like a VW, would be big enough for rides.

St: Here is a picture. You are right. She has a brother and a sister. Can I go on reading?
T: Sure.

St: . . .The university was in a big building, like the airport. . . What does "university" mean.
T: It is a place where people go to study things they want to find out more about.

St: Is this the word "university"?
T: Yes.

St: Which student answered the question first?
T: The dark haired boy.

St: And who answered after that?
T: I believe the person right behind him.

(Student just looks through the books for one minute.)

St: Teacher, do you like this story?
T: I think it is neat--she is a bright girl, very inquisitive.

St: How do you spell "inquisitive."
T: i n q u i s i t i v e

St: What would you do if you would want to learn a lot?
T: Well, study by myself, use a library, find people who know more than I do. . .

T: Can you find a library building somewhere in this picture?
St: Here is one, I think.

Student takes a crayon and starts coloring the picture.

T: What did the boy in the story do for Christmas?
St: He went to his father's house.

T: What was the boy's present like in the story?
St: It was big and colorful.

T: How was the Christmas tree decorated?
St: It has bulbs on it and colored balls and snow.

T: What is a holiday?
St: It's a special day, when we celebrate something.

St: How did they celebrate Christmas in this story?
T: The whole family got together and spent the Christmas day at the fathers house.
St: How many children were there in the family?
St: One-two-three--there are only three.

T: Would you tell the story in your own words?
St: Well, first the boy went home, then he went to sleep. He woke up very early the next morning and went downstairs to look for his presents.

T: How would you cut the tree down in the forest if you lost your saw?
St: I'd look for an axe, or go and borrow a saw.

St: How would you explain what Christmas means?
T: Well, it is a Christian holiday, where we celebrate the birth of Christ.

T: Why would people want to celebrate the birth of Christ?
St: Probably because they think Christ was a very good person.

St: What happened after the boy went to church?
T: After he went to church, he took a long walk into the woods and thought about his life.

T: What happened after the boy spoke to his priest?
St: He decided to learn Zen.

St: Why do you think we celebrate holidays?
T: Because they're fun, and you get to see a lot of friends, and, let's see, well, I think people like to get together at times.

T: Can you guess why Santa Claus is a weirdo?
St: Because he came from Pittsburg?

St: What kind of things happen, you think, if Christmas came in the summertime?
T: I would decorate my rose bushes, and have a swimming pool Christmas party!

St: How would you keep kids from ripping off toys in the stores?
T: Have policemen frisk them.

St: What is an angel?
T: A spiritual being.

T: How would you build a Christmas fire without matches?
St: I'd use a Zippo light.

T: Can you guess what would happen if Santa looked like Joe Namath?
St: Yeah, he'd wear panty hose.

T: Why do you think Santa chose to come down the chimney?
St: Because it's the fastest way.
T: Do you see a chimney?
St: Here is one.
T: What things could you do to surprise your family on Christmas?
St: I would get up early and surprise them with a big breakfast and I could make presents for everyone myself.

T: How would you choose to hide the presents from everyone in your family?
St: I'd stick them in the basement.

T: What do we mean by Christmas prayer?
St: It's a way of sending a personal message to God.

St: How are prayer and meditation alike?
T: They're both wasy of communicating with some sort of God.

St: What would you do to stop teachers from talking so much about Christmas?
T: Start talking about something else, or bring in other things, or just tell them to stop talking about it!

T: What is it that makes Christmas different from other holidays?
St: Christmas means Christ's birthday.

St: How are decorations and presents alike?
T: They're both things we have on holidays, and they make holidays fun.

T: Tell me everything that happened before the holiday in the story.
St: The car broke down and the people were held up so long that they were going to be too late so they went to a phone. . .

St: Can you remember what the man's name was?
T: Kris Kringle.

T: What happened to the girl on the street corner?
St: She got hit by a snowball, which really hurt her badly.

T: How would you prevent the ornaments from breaking?
St: I'd make a rule that all kids keep their hands off and they only could look at them.

St: What would happen if the Christmas tree was made of wood?
T: It might start a fire.

T: Put the cards in order so they tell a story about God.
St: I can't.

T: What is mistletoe?
St: A type of plant we use on Christmas to decorate the house, it has little red

T: What would happen if we eat hot dogs on Christmas?
St: I don't know.

T: What is holly?
St: Holly is a plant, with sticky leaves, very pretty.

T: What happened to Kris Kringle?
St: Kris Kringle turned into Santa Claus.

T: Tell me the story of Christmas in your own words.
St: One day, a long long time ago, Mary and Josef were going to have a baby. . .

Child gets up - gets kleenex - blows nose - sits down

T: How does Santa look in this picture?
St: If Santa was Jewish, he would not eat pork.

St: Teacher, will you tell me the story of the old man Scrooge?
T: No, I don't want to now.

St: Can you think of ways to change old man Scrooge's behavior?
T: Well, we might try behavior modification!

T: How would you prevent Scrooge from waking up at night?
St: Give him some sleeping pils, or a lot of wiskey.

St: Teacher what finally happened to Tiny Tim?
T: Scrooge game him a present and he was very happy.

St: Can you tell me what happened to Santa Claus before he left the North Pole?
T: He slipped on the ice and got a hernia.

Child plays with objects on table. Teacher just watches.

T: How many ornaments are on the tree?
St: Six.

St: Who opened the peanuts first?
T: The little boy opened the peanuts first.

T: Explain why we go to church on Christmas.
St: To pray and celebrate Christ's birthday people go to church for that reason.

St: Teacher, what is this picture?
T: That is a nativity scene.

St: Teacher, what happened to Christ after he was born?
T: He lived with Mary and Joseph, and when he grew up he became a carpenter.

St: How do you explain Christianity?
T: It's a religious following, some believe that a lot of people live by.

St: And what did the boy do in the story?
T: He was a thief, I believe.

St: What would happen if Santa lost 200 lbs. of his weight?
T: He could slip through the chimney very fast!

St: How can we save money for Christmas presents?
T: I don't know.

T: What color is Santa's beard in the picture?
St: White.

T: What are the shapes of the decorations in the picture?
St: I don't know.

Teacher and student begin to tidy up.

APPENDIX D

Clarification of Categories on the TPQR Observation System

Q: What is the difference between beige and brown?

Q: Do you think so?

Q: What else would you do with it?

Q: What is this?
R: I don't know.
T: touches child's hair . . .
R: "Hair!"

Q: How does it sound?

Q: How do you know you are right?

Q: How many words do we know now?

The teacher gives the child sentences to read with difficult words in them which the child does not know. The child is told to think "what makes sense" in attempting to "read" the word.
Ex.: I go to feed the dog in the snow.

Q: What is the opposite of 'before'?

Q: Why did you say this word was Christmas?

"Are you sure?"

Math lessons: What is 2 and 2?

Math problem: How would you find out if the answer is correct?

Q: Is this a fair trade - does the change you gave me plus the merchandise equals the money I gave you?

Q: Then what happened -- anything else?

Q: What book do you want to read next week?
R: A Lassie book.
Q: Do you know what kind of dog a Lassie dog is?

Q: Where is the 'it' (the 'it' is not there)?

T: If you walk outside, then .....(child needs to fill something in, the intonation was like a question sentence.

Q: You would not have anyone do that to you would you?

Q: Why do you wear gloves in the winter?

Child is adked to write in missing letters.

Q: How would you explain what _____ means?

Q: Can you spell this word?
R: "Yes."

Q: Do you know what the seasons are?

Q: What can you tell me about winter?--it has to be in one sentence

Q: Now, is that a sentence?

T: Tell me a sentence about Christmas.

Problems

1. If questions are written out and the child reads the questions code the question as if teacher asked. teacher

1.1. If questions are in a workbook and the child answers them silently.

2. Filling in . . . when the intonation is a question-like intonation.
Pointing . . . "and this one..." questioning intonation.

Solution: If you can gramatically put a questionmark behind it?

3. On or off the less subject.

4. When the teacher asks a question but does not provide opportunity for the child to respond. Instead the tutor goes right on giving additional information and repeat the question in the same or slightly different form?

4.1. Same as 4., but teacher now asks a totally different question.

5. The child initially gives no response, then, unsuspected gives the right response after that.

5.1. How long to wait for 'no response'.

6. Wrong answers.

7. Subtle differences between category 5 and 6.

APPENDIX E

Sample Forms, Schedules for CATTS Project 18

K495 - Practicum Dr. Sitko

DATE: X - YZ - 76

SCHEDULED TIME: 8:45 - 9:15 REAL TIME:

TUTORS: Name Gember No. 08

CHILD: Name Dona No. 03

CODER: Name N.F. No. 02 Box No. B

CODER: Name _____ No. _____ Box No. _____

STATION: (mark x) A X B _____ C _____

COMMENTS:

LESSON OBJECTIVE:

CROSS TUTOR CODING RECORD

BOOTH NO. A DATE X-4Z-76

LESSON NO. 25 TUTOR NAME Gember PUPIL Dana

TUTOR 08

PUPIL NO. 03 BOX UP BOX DOWN

CODER NO.

TIME 8:45

FEEDBACK 02

SEN

LESSON NO. 19 TUTOR NAME Maggi PUPIL Mark

TUTOR NO. 13

PUPIL NO. 05 BOX UP BOX DOWN

CODER NO.

TIME 9:15

FEEDBACK 04

SEN

LESSON NO. 23 TUTOR NAME Pawlik PUPIL Sam

TUTOR NO. 17

PUPIL NO. 01 BOX UP BOX DOWN

CODER NO.

TIME 9:45

FEEDBACK 02

SEN

FIRST SEMESTER

	M	Coder	T		W	Coder	Th	Coder	F	Coder
9-9:30	Nina Palmer	01			Brenda Conklin	03	Karen Koday	07		
	Brenda Conklin	02			Karen Koday	01	Donna Zettlemeir	05		
9:45-10	Margie Streut	02			Kathy Newhouse	01	Margie Streut	05	Kathy Gallagly	01
	Kathy Gallagly	03			9:45-10:15 Rebecca Seifert	03	Kathy Newhouse	07	9:45-10:15 Rebecca Seifert	02
10:30	Janet Pawlik	01			Dena Feltel	07	Linda Gould	06	Janet Pawlik	03
							Donna Zettlemeir	02	--	
10:30-11	Maria Gember	05			Dena Feltel	01	Patrice McElroy	02	Patrice McElroy	01
	Margarita Sainz De La Pena	03			Margarita Sainz De La Pena	07	Linda Gould	07	Maria Gember	03
11-11:30	Tony Maggi	03	Tony Maggi	02	Theresa Lohmuller	03	Kathy Gaughan	07	Daniel Fenstermaker	02
	Kathy Gaughan	05	Kathy Bailey	07	Kathy Bailey	01	Theresa Lohmuller	05		
11:30-12	Karen Gross	01	Donna Rogers	07	Donna Rogers	03	Daniel Fenstermaker	06		
	Nina Palmer	02	Pat Bieritz	02	Karen Gross	07	Pat Bieritz	07		

TUTOR SCHEDULE - K495 SPRING 1976
SECOND SEMESTER

Tuesday	A	B	C
8:45-9:15	Gember-08 (Dona 03) video 05 CODER	McElroy-14 (Carla 06) scope 07 CODER	Seifert-20 (Jan 02) super 02 CODER
9:15-9:45	Maggi-13 (Mark 05) super 03	Gaughan-07 (Alice 09) scope 02	Zettlemeier-22 (Keith 11) video 05
9:45-10:15	Pawlik-17 (Sam 01) video 05	Gross-10 (Richard 07) scope 03	Rogers-18 (Jim 10) super 07
10:15-10:45	Gallogly-06 (Terry 04) super 02	Lohmuller-12 (Mark 05) scope 07	Palmer-16 (Melinda 08) video 03
10:45-11:15	Newhouse -15 (Terry 04) video 07	Conklin -03 (Keith 11) scope 05	Bailey-01 (Alice 09) 02
11:15-11:45	Gould-09 (Sam 01) super 05	Bieritz-02 (Richard 07) scope 02	Feinstermaker-05 (Jim 10) video 07
Thursday			
11:00-11:30	Feinstermaker-05 (Jim 10) video 05	Bieritz-02 (Richard 07) scope 07	Gould-09 (Sam 01) super 02
11:30-12:00	Felkel-04 (Dona 03) super 02	Strouts-21 (Jan 02) scope 05	Koday-11 (Melinda 08) video 07
Friday			
8:45-9:15	Gember-08 (Dona 03) video 07	McElroy-14 (Carla 06) scope 06	Koday-11 (Melinda 08) video 05
9:15-9:45	Maggi-13 (Mark 05) super 06	Gaughan-07 (Alice 09) scope 07	Zettlemeier-22 (Keith 11) video 03
9:45-10:15	Palmer-16 (Melinda 08) video 05	Strouts-21 (Jan 02) scope 03	Gallogly-06 (Terry 04) super 06
10:15-10:45	Seifert-20 (Jan 02) super 07	Lohmuller-12 (Mark 05) scope 05	Newhouse-15 (Terry 04) video 03
10:45-11:15	Pawlik-17 (Sam 01) video 06	Gross-10 (Richard 07) scope 07	Bailey-01 (Alice 09) 05
11:15-11:45	Felkel-04 (Dona 03) super 07	Conklin-03 (Keith 11) scope 06	Rogers-18 (Jim 10) super 05

Work Schedule 2nd semester Coders for K495

	Monday	Tuesday	Wednesday	Thursday	Friday		
Denise Birnbaum 01		8:30 / 12:00 SUPERVISE	↑ CODING MAKE-UP SESSIONS	11:00 - 12:00 SUPERVISE	8:30 - 12:00 SUPERVISE		
Nancy Fischer 02		8:45 / 11:45 Break 9:45		11:00 - 12:00	OFF		
Judy May 03		8:30 / 12:00 SUPERVISE CODE: 9:15/10:45		10:45 - 12:15 SUPERVISE	8:30 - 12:00 SUPERVISE code 9:15 - 10:45		
Nancy Billingsley 04	Didn't code 2nd semester						
Doug Hoffer 05		8:45 / 11:45 Break 10:15		11:00 - 12:00	8:30 - 12:00 Break 9:15		
Nancy Petersen 06		OFF		OFF	8:30 - 12:00 Break 10:15		
Mindy Giles 07		8:45 / 11:45 Break 9:15	↓	11:00 - 12:00	8:30 - 12:00 Break 9:45		
Mark Ellinger 08	~ Didn't	code 2nd semester		- Back-up	Coder ~		

APPENDIX F

TPQR Observer Training Manual

MEMO FOR K495 PRACTICUM TUTORS

Subject: Performance Criteria and Grading System.

There are four criteria that determine the grade in the practicum. Description and weighting are as follows:

(1) All tutors must conduct 20 lessons this semester (1/4 of grade).

In order to meet this criteria all absences must be made-up. This is true whether the absence is due to pupil or tutor. You are responsible for arranging the make-up. You will need to call and check with Brenda on the time for the make-up. Make-ups should try and be scheduled on Monday or Wednesday morning. Otherwise work out a time with Brenda. Conducting 20 lessons automatically assures you of an A for 1/4 of your grade (unless there are highly unusual circumstance and make-ups cannot be effected).

(2) Completing all assignments (1/8 of grade).

There are two types of assignments; (1) Lesson Plans and (2) Analysis of Reading Lessons. These together should take no more than two hours per week. Lesson Plans are due one week before your scheduled time of tutoring. Turn in two copies of each lesson plan to Brenda's office (or tack them on the bulletin board outside her office if it is locked).

(3) Turning all assignments in on time and appearing for tutoring sessions on time (1/8 of grade).

If you complete all assignments, and turn them in on time, and also show up for all lessons on time, then you automatically get an A for 1/4 of your grade (#2 and #3).

(4) Supervisory rating of teaching performance and quality of lesson (1/2 of grade).

Included in this criterion are our evaluations of your lesson plans and

your actual lessons. For your lesson plans we will use the Checklist For Lesson Plan Evaluation (see Module 2). We will base our evaluations of your actual teaching on our subjective impressions as well as our analysis of the computerized printouts you will receive after each lesson. You will receive another module which will show you how to analyze your printouts. We will also schedule supervisory conferences throughout the semester.

There is no reason why you can't get an "A" this semester. Criteria 1 through 3 permit you to get an "A" for holding 20 lessons, being on time, doing all assignments and turning these in on time. Only the last criteria is qualitative, so there is no reason why everyone in the class can't get an A or B.

"Tout est bien que finit bien".

("All is well that ends well").

Note: *If Brenda's classes are cancelled, no make-up is required.

Introduction

The tutoring program you are participating in this year is designed to meet the following objectives;

1. To provide a laboratory classroom in which to practice and develop selected teaching skills.

2. To assist a child who is below grade level in reading to improve his/her reading skills.

3. To assist trainees in refining interactive teaching questioning skills by providing feedback on teaching performance.

Thus far, you have completed one semester of work with a pupil, and have demonstrated some mastery over the problems of selecting appropriate instructional objectives and lesson planning. Work this semester will concentrate on refining your interactive teaching skills. Interactive teaching skills are those give and take transactions (mainly verbal) between teacher and pupil which are under the control of the teacher and geared to the accomplishment of specific instructional objectives. We will primarily focus on student responses to teacher initiated questions.

This semester, the major instructional objectives in this practicum are concerned with the teaching of reading, especially reading comprehension. Achievement of the instructional goals for the pupil requires first of all, careful analysis of the instructional task and then a construction of a plan of action for achieving the goals. A similar process takes place in determination and analysis of behavioral goals of teaching.

The focus this semester will emphasize goal setting for the pupil as well as the setting of teacher behavioral goals. It is certain that your interactions with the pupil will affect the pupils' responses, and over time should affect how the pupil learns.

The Computer-Assisted Teacher Training System (CATTS)

The Teacher Education Laboratory in which you conduct the practicum is part of a unique Computer-Assisted Teacher Training System (CATTS), designed for the development and improvement of interactive teaching skills.

The CATTS system was developed at the Center for Innovation in Teaching the Handicapped (CITH), and it is designed to provide real-time (instantaneous) feedback or delayed (post-teaching) feedback of information about teacher and pupil interactions. How feedback is used for the development of teaching skill will be discussed in detail in Module 3.

The Role of Feedback in Skill Development

Development of teaching skill obviously requires the opportunity to practice. But as psychologists have consistently shown, practice alone is insufficient to assure the development of skills. For practice to be instrumental in changing teaching behaviors in a desired direction, clearly articulated behavioral objectives for both teacher and pupil must be present. Another crucial variable in skill development is feedback on performance. Both pupils and teachers need feedback on their performance in order to modulate their teaching behavior/learning responses in terms of the behavioral objectives. Thus, the three critical factors in skill development are: (1) clearly defined goals or behavioral objectives, (2) opportunity to practice, (3) feedback.

The feedback teachers usually receive is from supervisors who often vary greatly in their degree of objectivity or in their preferences for focusing on one aspect of teaching or another. The CATTS system provides a method of overcoming the subjectivity of supervision by providing feedback in the form of observation system data. The definitions of the categories of the observation system are public to all so that the meaning of the feedback is the same for both trainee and supervisor. In addition, the

objective nature of the feedback makes self-evaluation an alternative to traditional supervision.

The application of computer technology in teacher education is based upon a teacher training model also developed at CITH. The model should help you visualize how your teaching experiences will be structured in this practicum course.

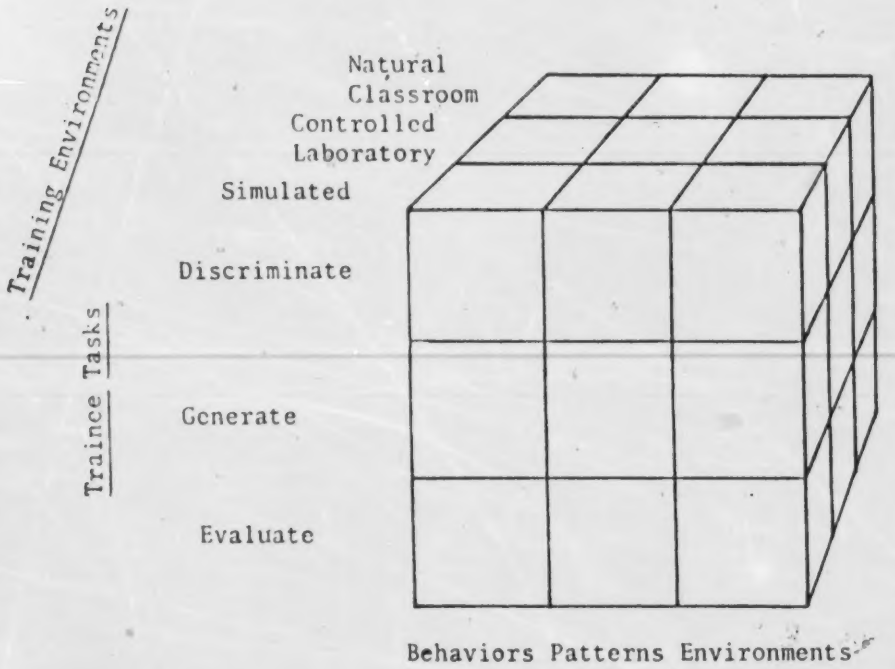

Figure 1: CITH Teacher Training Model[1]

[1]Semmel, M. I. Application of Systematic Classroom Observation to the study of pupil-teacher interactions in Special Education, 1974.

Phases of Teacher Skill Development[2]

1. In developing teaching skills, you obviously need to know what they are - you are able to discriminate instances of these skills when you see them. One way of acquiring discrimination skills is by learning an observation system which focuses on those teaching skills.

2. The next phase is for you to try out those teaching skills, or generate them in a teaching situation. In this practicum you will have numerous opportunities to practice specific teaching skills that you chose to work on.

3. In order to know how well you have developed the given instructional skills and how to modify your performance to bring it closer to your objectives, you need feedback for evaluation of performance. Rather than having someone else evaluate your progress, you will have data upon which to evaluate yourself. You will be able to do this by using the objective observation system records that trained observers have collected during the lessons you teach.

Feedback as a Source for Decision-Making

Feedback and evaluation information can also be used for an analysis of your pupil's performance as well as your own, and you can incorporate this source of information to plan new behavioral goals and strategies for the next lesson. Thus, in addition to using feedback for developing interactive teaching skills, you can use the feedback data for instructional decision-making - e.g., lesson planning based upon pupil/teacher behaviors

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[2] This section is reprinted from CATTS Manual, 1973, Module 2. Observation system coding (Frick, T. and Hasselbring, T.).

that have actually taken place. This information and analysis can become the basis for deciding how you will change and structure the interactive aspects of the next lesson.

Learning an Observation System

The key to the implementation of the training model (Discriminate-Generate-Evaluate) and the development of interactive skills is knowledge of the categories of the observation system covering the domains of interest. This semester, the focus is on pupil reading comprehension. This is the domain of interest.

In order to interpret the feedback available through CATTS, you will need to become familiar with the terminology and definition of the Teacher Pupil Question Response System (TPQR). You will need to be able to discriminate different instances of pupil responses and teacher questions that occur during reading, so that you can interpret feedback and modify your own teaching behaviors.

You will soon receive instruction on how to use the feedback available to you while you are teaching, and on how to analyze the feedback data in planning strategies for improvement of oral reading (Module 3).

The next section of this manual contains the categories of TPQR Observation System.

Read the Manual first. Memorize the definition of each category and make note of any questions you have concerning the TPQR, so that they can be discussed during your supervisory conferences.

Module 2

Writing Lesson Plans - Required Guidelines

The present contains descriptions of the items to be included in preparing your lesson plans. Since they are arranged in logical order for the development of lesson plans, it is a good idea to check the items and write your lesson plan in the order in which they are given. If you use this as a standard format in the preparation of your lesson plans, it will facilitate evaluation and also make the feedback more meaningful for you.

In addition, you will find a copy of the evaluation sheet that will be returned to you each time you submit a lesson. The scale used on the evaluation sheet is for your guidance in interpreting the evaluation - the scale points are not grades and will not be used as such.

CHECKLIST FOR WRITING LESSON PLANS

1. THE ENTRY TEST:

The entry test should check the prerequisite skills the pupil needs in order to understand your lesson. If no special prerequisite skill is needed, mention that in your lesson plan. If the lesson objective is to teach the pupil how to write his name, you would expect him to know how to write the letters of the alphabet. Your entry test will check if the pupil knows how to write different letters. The entry test does not test the attainment of the lesson objectives.

2. TASK ANALYSIS:

The next and the most important step is a task analysis. Of course, your lesson plan need not contain the task analysis, but unless you do it, your subobjectives may turn out to be irrelevant and your lesson plan incomplete.

2.1 The Main Task is Analyzed up to Entry Level:

If the main task is to copy a sentence, the subtasks could be:

1. Begin the first word with a capital letter,
2. Leave small space between letters in a word,
3. Leave more space between words, and
4. Place a period at the end of the sentence.

We need not include the task of writing the letters as this is a part of the entry behavior and checked by the entry test.

2.2 There is no Unnecessary Subtask:

If the main task is for the pupil to write the name of his neighbor, do not ask the pupil to draw his neighbor's face and name him. Asking the pupil to draw may be a good idea to keep the child busy, but it is not a necessary subtask in order to perform the main task.

2.3 There is no Trivial Subtask:

If the objective includes pupils' copying a sentence, do not include such subtasks as "the child writes from left to right" unless you have a very strong reason to suspect that the pupils have to be taught this.

2.4 The Subtasks are Arranged in Suitable Sequence:

In the example in item 2 the exact sequence of teaching is not important. But in some tasks mastering one subtask is necessary before the pupil can master another subtask. In such cases, arrange the subtasks in the correct sequence.

3. MAIN AND SUBOBJECTIVES:

The task analysis is transferred to the lesson plan in the form of subobjectives. Write a subobjective for each subtask you have identified. Use the items 3.1 to 3.5 below to check your main objective and each of your subobjectives.

3.1 The Objectives are Specified in Performance Terms:

"Know," "grasp" and "understand" are nonbehavioral terms which should not be used in writing these objectives. You may find the ALPHABETICAL LIST OF PERFORMANCE TERMS useful. (pg. 5)

3.2 The Objectives Contain Suitable Performance Range:

Range indicates variations in the question asked of the child. "Discriminate between the sounds of different letters" does not contain the range. You will have to expand it to "Discriminate between the sounds of p, k, n, t and d."

3.3 The Objectives Contain Performance Conditions:

You will have to specify what help is to be given to the child. If Johnny may look at his name written on the chalk board and copy it, or if you will help him when he has difficulty, specify this as a part of your objective. If not, say "without help."

3.4 The Objectives Contain Suitable Time Limit:

This is the amount of time you give Johnny to write his name (e.g., "within two minutes"). This time limit is not to be confused with the thirty minutes class time for the entire lesson.

3.5 The Objectives Contain Suitable Performance Standards:

If you want the pupil to perform without any error, write "without any mistake," or "with 100% accuracy." If you do not expect such perfection write "9 out of 10 items" or some other suitable standard. Another type of standard is to specify what the response should be. You want Johnny to use capital J, and you will not accept any spelling mistake; but you do not mind if Johnny's writing is not perfect, as long as it is legible.

4. CRITERION TESTS FOR MAIN AND SUBOBJECTIVES:

No doubt your criterion test is built into your classroom activity. But the activities are planned on your criterion test and not the other

way round. Therefore, please write them seperately from your instructional activities.

4.1 The Test is a Valid Measure of the Objective:

If Johnny is to write his friend's name, teach him to draw his friend's picture and name it, if you want to. But do not build a criterion test around drawing pictures. The criterion test measures the objective, nothing more and nothing less.

5. TEACHING STRATEGIES:

The following items are often a matter of individual judgement and intuition. Similarly, evaluations may be subjective. Keep this in mind when reacting to the evaluations.

5.1 The Instructional Materials Used are Appropriate to the Objective:

5.2 The Instructional Activities are Relevant and Appropriate to the Criterion:

5.3 The Overall Layout is Done with Care:

5.4 Lessons are Well Planned for the Period of Activity:

ALPHABETICAL LIST OF PERFORMANCE TERMS

build

change
classify
color
combine
compare
complete
count

discriminate
distinguish
draw

explain

fill in
finish

give

identify
imitate

keep

label
list
locate

make
match

name

organize

plan

question
quote

read
recall
recognize
restate

say
select
spell
state

tell
test

underline
use

write

K495 Spring, 1976
Dr. Sitko

NAME _____ DATE _____ Lesson No. _____

CHECKLIST FOR LESSON PLAN EVALUATION

NO YES

1. Entry Test 1 2 3 4 5

   1.1 The entry test is suitable for the entry level of the target student. 1 2 3 4 5

   1.2 The entry test excludes the lesson objectives. 1 2 3 4 5

2. Task Analysis

   2.1 The main task is analyzed into simple subtasks. 1 2 3 4 5

   2.2 There are no unnecessary subtasks. 1 2 3 4 5

   2.3 There are no trivial subtasks. 1 2 3 4 5

   2.4 The subtasks are arranged in suitable sequence. 1 2 3 4 5

3. Objectives

   3.1 The objectives are specified in performance terms. 1 2 3 4 5

   3.2 The objectives contain a suitable performance range. 1 2 3 4 5

   3.3 The objectives contain performance conditions. (equipments, aids, etc.) 1 2 3 4 5

   3.4 The objectives contain suitable time limits. 1 2 3 4 5

   3.5 The objectives contain suitable performance standards. 1 2 3 4 5

(OVER)

	No				YES
	1	2	3	4	5

4. Criterion test for main and subobjectives

4.1	The test is a valid measure of the objective.	1	2	3	4	5

5. Teaching Strategies

5.1	The instructional materials used are appropriate to the objective.	1	2	3	4	5
5.2	The steps in teaching are relevant to the criterion.	1	2	3	4	5
5.3	The overall layout is done with care.	1	2	3	4	5
5.4	Lessons are well planned for the period of activity.	1	2	3	4	5

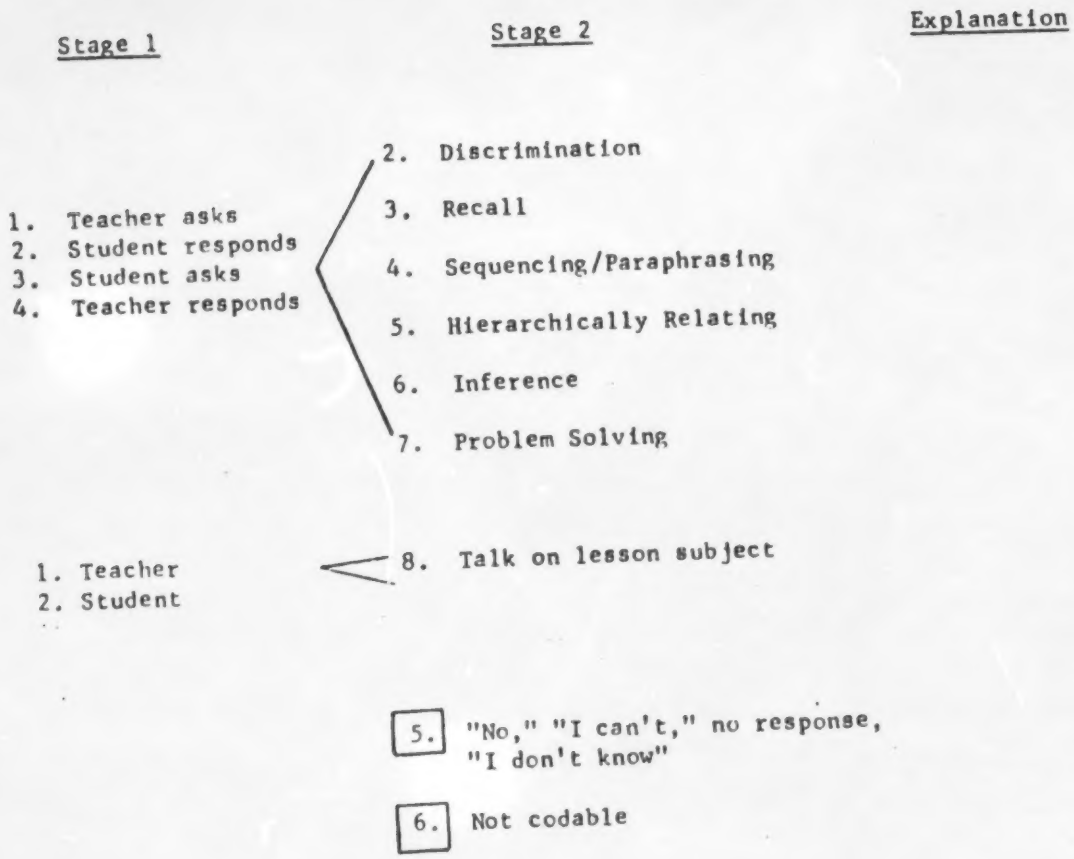
K495 Spring, 1976
M. C. Sitko

TPQR OBSERVATION SYSTEM

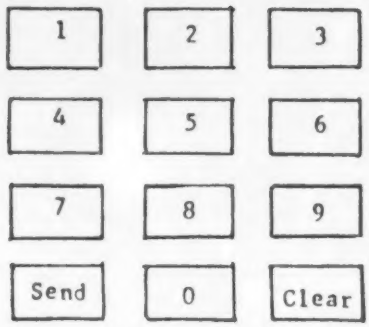
Introduction

You will be using an observation system to study both teacher and student behavior interacting in a teaching/tutoring situation. An observation system is a tool used to describe behavior as objectively as possible as it occurs in the classroom. This observation system focuses student responses to teacher initiated questions. There are different types of teacher questions and student responses. This system is designed to observe categories of higher and lower level responses and questions. "Higher" and "lower" are defined in terms of the cognitive processes the student must perform in order to respond appropriately. The specific content of the lesson will help you decide which cognitive process the student is using when responding to a specific teacher's question.

The system has six response question categories. It has three additional categories dealing with other behaviors. It is your job as a teacher to memorize the categories, their definitions and their numbers.


Stage 1
Stage 2
Explanation
1. Teacher asks
2. Student responds
3. Student asks
4. Teacher responds
2. Discrimination
3. Recall
4. Sequencing/Paraphrasing
5. Hierarchically Relating
6. Inference
7. Problem Solving
1. Teacher
2. Student
8. Talk on lesson subject
5. "No," "I can't," no response, "I don't know"
6. Not codable

In the actual training and coding situation you will be using a button box, which will look like this:



You will be coding the question and response behaviors via a number of coding systems, through the use of the button box which is linked to a computer. The way in which you tell the computer what you have observed entails a two stage process:

Stage 1: For categories 2 through 7 you must designate the initiator and the responder of the interaction. You must push one button only.

Stage 2: You then need to tell the computer in which category the question or the response belongs. For this you will use the number codes for the categories as will be explained in this manual.

After coding each question or each response you need to push the 'Send' button in order to send the information into the computer.

Note:

1. A question is a question if and only if, when written out, one would put a question mark behind the expression. For example:

Questions

a) Can you put these pictures in order?

b) What does this word on the card say? . . . (the student does so) . . . and this one? (questioning intonation) . . . (child does so) . . . and this one?

↓

Grammatically, these expressions require a question mark, either by the sentence structure or by the questioning intonation. So, they are . . .

Not questions

a) Put these pictures in order.

b) Tell me what this word is . . . (the student does so) . . . and this one (commanding intonation) . . . and this one.

↓

Grammatically, these expressions do not require a question mark. So, they are not . . .

Category 2 - Discrimination

2.1 Definition

Facts have to be completely or partially perceived by the senses.

2.2 Extension of definition

The content of the appropriate response is directly perceived by the senses, including hearing (sounding out, spelling) and feeling. The student is to indicate which things are alike or different or to choose or confirm a correct answer from a set of explicit alternative answers.

2.3 Examples

T: "Can you sort the cards with the word cat on them into one pile and the cards with the word mat into another pile?"

St: (Sorts cat cards into one pile and mat cards into another pile.)

St: "Are your shirt and shoes the same color?"

T: "Yes."

T: "Will you find another one that looks just the same?"

St: (Points to a letter.)

St: "Can you tell me what is in the picture?"

T: (Does so.)

T: "Close your eyes. Can you feel the shape of this letter and tell what the letter is?"

St: (Feels the shape of the letter.) "A 'B'. I think."

T: "Can you point to the letter 'A'?"

St: (Points to the letter 'A'.)

St: "Which sides of the rectangle are longer?"

T: "The left and right sides."

T: "Can you show me the word 'clown'?"

St: (Shows the word.)

T: "How do you spell the word 'cat'?"

St: "C--hm--A and T."

St: "What does this letter sound like?"

T: "[Pə]."

T: "Can you say this word?"

St: "Pan."

T: "And can you read* this word?"

St: "Pillow."

*For the purpose of this manual, 'reading' is defined as a discourse of two words or more: I go; Dad went; The house; She is tall. Therefore, single words are coded as discrimination.

2.5 Exercises

Examples and non-examples of Discrimination are given.

2.5.1 Code 1 2 after each Teacher Discrimination question.

Code 3 2 after each Student Discrimination question.

Code 2 2 after each Student Discrimination response.

Code 4 2 after each Teacher Discrimination response.

Do not code the non-examples.

a) T: "Will you tell me the first lucky thing that happened to Jimmy on the way to school? -- --

St: "Jimmy found a one-dollar bill." -- --

b) T: "Are these two words alike?" (Holding up flashcards.) -- --

St: "Yes." -- --

c) St: "Is this the letter S?" (Points to the letter S) -- --

T: "Yes, that is an S." -- --

d) T: "If I put a glass upside down over a candle, what happens?"

St: "I know. The light goes out."

e) St: "Teacher, what is this word?"

T: "That reads 'bear'?"

f) T: "Can you read this word?"

St: "Yes, that is 'grass'."

g) St: "How does this letter sound?"

T: "Ssss.."

h) St: "What would you do, if your house got on fire?"

T: "Run out as quick as possible and call the firepersons."

Answers

Examples: b) an alikeness has to be indicated
b), c), e), f), g) the correctness of a statement has to be recognized; the information required can be directly perceived by the student.

Non-examples: a), d) and h) The information required cannot be directly perceived by the student.

2.5.2 In the blank spaces give examples and non-examples of Discrimination questions and responses.

examples:

St: " " 3 2

T: " " 4 2

T: " " 1 2

St: " " 2 2

T: " " 1 2

St: " " 2 2

St: "

T: "

non-examples; T: "

St: "

T: "

St: "

St: "

T: "

St: "

T: "

" 3 2

" 4 2

" 1 _

" 2 _

" 1 _

" 2 _

" 3 _

" 4 _

" 3 _

" 4 _

Create the examples yourself! Do not cheat!

Category 3 - Recall

3.1 Definition

Facts have to be recalled from memory.

3.2 Extension of definition

The content of the appropriate response cannot be directly perceived by the student but must be recalled from memory. However, the student is not required to further act upon the recalled information.

The requested information may be single or multiple pieces of information, which are not related in a hierarchical fashion. Facts are merely listed. The requested information may be objective or personal and may have been learned at any time in the student's life prior to asking the question.

3.3 Examples

St: "What what was the girl's name?"

T: "Dina."

T: "What did you see at the zoo?"

St: "Monkeys, elephants, a great big bear and lions and tigers."

St: "What kinds of ingredients do you need to bake a cake?"

T: "Butter, eggs, sugar, flour, and you can put raisins in."

3.4 Notes

3.4.1 Do not confuse Recall with Discrimination.

St: "Did Johnny's mother take him to the store or to the park?"	St: "Look at the picture in your book. Did Johnny's mother take him to the store or to the park?
T: "I think to the store."	T: "To the store."

T: "Can you describe a castle to us?

St: "A castle has usually many towers, a lot of big rooms, and . . . "

T: "Can you describe to the class what a turtle looks like?"

St: "Let's see. A turtle is small, has a little round head, a shell for his back to protect his body, four lets, and a little tail."

↓

The response cannot be directly perceived by the student, but has to be pulled from memory. So this is . . .

T: "Can you describe this castle you see here (on a slide) to us?"

St: "It has 6 towers, a kind of canal around it, and . . . "

T: "What do you see, looking at this turtle?"

St: "Four small legs, a hard shell as his back, and a funny little head."

↓

The response is in front of the student. A perceptual discrimination has to be made. So, this is . . .

3.5 Exercises

Examples and non-examples of Recall are given.

3.5.1 Code 1 3 after each teacher Recall question, 3 3 after a student Recall question.

Code 2 3 after each student Recall response, 4 3 after a teacher Recall question.

Do not code the non-examples.

a) T: "Which color is red?" -- --

St: "This ball is red."

b) T: "What did you watch on TV yesterday?" -- --

St: "Sesame Street." -- --

c) St: "What would you do if you found an injured cat on the road?" -- --

T: "Call the veterinarian right away and take care no one moved the cat." -- --

d) T: "What did the girl in the story do that got her into trouble?"

St: "She kept pulling the cat's tail."

Answers:

Examples: b) and d) The information requested cannot be directly perceived, but has to be pulled from memory.

Non-examples: a) and c) In a) the information requested can be directly perceived. In c) the teacher has to do more than simply recall information.

3.5.2 In the blank spaces, give two examples and two non-examples of Recall questions and responses.

examples: T: " " 1 3

St: " " 2 3

St: " " 3 3

T: " " 4 3

non-examples: T: " " 1 _

St: " " 2 _

St: " " 3 _

T: " " 4 _

Category 4 - Sequencing/Paraphrasing

4.1 Definition

Facts have to be perceived or recalled and sequenced in time.

4.2 Extension of Definition

The content of the appropriate response may or may not be directly perceived by the student. The response requires facts (1) to be recalled and ordered in time, or (2) to be perceived and ordered in time.

Sequencing explicitly demands a description or creation of a sequence of temporally or visually ordered events. Paraphrasing implicitly demands to describe a sequence of visually and temporally ordered events. Paraphrasing questions require a child to retell or create a story.

Questions containing a time-ordering word (for example: first, middle, next, last, before, after, earlier, later, finally) require a time-ordering element in the construction of the response. Both question and response will then be coded as sequencing/paraphrasing, unless the question belongs to a higher number category, (see page 31). The response does not require construction of new knowledge, and could consist of only one word. (See last example under 4.3.2.)

4.3 Examples

4.3.1 Sequencing

T: "Will you tell me everything that happened before Ann noticed that her toolkit was missing?"

St: (Does so.)

T: "Can you put these pictures in order so they tell a story?"

St: (Does so.)

4.3.2 Paraphrasing

T: "What was this story about?"

St: (Retells the story.)

T: "Can you tell me everything that happened in this story?"

St: (Does so.)

St: "Who entered the swimming pool first?"

T: "I believe it was John."

T: "Would you summarize this page for me?"

St: (Does so.)

T: "Did John hit Sue before or after the pencil was missing?"

St: "Before."

4.4 Notes

4.4.1 Do not confuse Sequencing/Paraphrasing with Recall.

T: "What was this story about?"	St: "What happened to Jimmy's hat in this story?"
St: (Tells story.)	T: "The hat got lost."
T: "Who first noticed that Jimmy's hat was missing?"	T: "Who noticed that Jimmy's hat was missing?"
St: "Rene did."	St: "Rene did."
↓	↓
Events have to be ordered in time. So, this is . . .	Facts have to be recalled. The student does not have to do anything with the facts. So, this is . . .

4.4.2 Do not confuse Sequencing/Paraphrasing with Discrimination.

T: "Look at this picture. Are both the lions and tigers eating the meat?"	St: "Will you tell me the story about the lion and the tiger who became friends?"

St: "Yes, they are.	T: (Does so.)
T: (Pointing at a series of pictures out of order) "Can you tell me what you see in these pictures?"	T: (Pointing at a series of pictures out of order) "Can you put these pictures in order?
St: (Describes the pictures.)	St: (Does so.)
↓	↓
The stimuli are in front of the student to be perceived. The student does not have to act upon the information. So, this is . . .	Events have to be ordered in time. So, this is . . .

4.5 Exercises

Fill in the correct codes.

4.5.1 a) T: "Will you summarize the story you have just read?" _ _

b) St: "Johnny lost his hat." _ _

c) St: "Can you sort the cards with the word cat on them into one pile and the cards with the word mat into another pile?" _ _

d) T: (Does so.) _ _

e) T: "Will you tell me all the things that happened to Little Bear on his way to visit his Grandmother?" _ _

f) St: (Does so.) _ _

g) T: "Can you put these pictures so that they tell a story?" _N_

h) St: "That's an elephant." _ _

Answers:

a) 1 4 b) 2 3* c) 3 2 d) 4 2

e) 1 4 f) 2 4 g) 1 4 h) 2 2*

*Here you see that a student's answer can belong to a different category than the teacher question. In this instance, the student made an inappropriate response. His/her response is coded in the category to which it belongs.

4.5.2 Give your own examples. Note that the questions and responses are predetermined by the codes in the right-hand column.

T:	"	1 3 watch out!
St:	"	2 4
St:	"	3 2
T:	"	4 2
T:	"	1 4
St:	"	2 4
St:	"	3 3
T:	"	4 4

Category 5 - Hierarchical Relating

5.1 Definition

Known facts have to be perceived and then related, to one another, in a hierarchical fashion.

5.2 Extension of definition

Facts have to be perceived or recalled and acted upon.

The content of the appropriate response requires the student to compare or contrast known facts; to categorize non-identical observations by their common denominator; to explain events or concepts; to give examples of concepts; to define events or concepts; or to find synonyms or opposites.

Hierarchically relating questions usually refer to general states of affairs, not to specific, individual events. There is no guessing involved.

5.3 Examples

5.3.1 Compare

T: "How are these two letters alike (b-d)?"

St: "Well, they both have a circle and a stick - but the circle is on different sides of the stick, ---and you almost say they're the same, only with the b, you put your lips together."

St: "What is the opposite of high?"

T: "Low."

St: "What is it that tigers have that makes them different from lions."

T: "Tigers have stripes and lions can climb trees. (In this case the teacher gave an incorrect but still hierarchically related answer. The teacher did make a comparison. See page 35 for further explanations.)

T: "Why are castles and teepees alike?"

St: "Because they both serve as a shelter place, as a house, a home."

5.3.2 Categorize

St: "Can you think of one word to describe all of the following: milk, cheese, yogurt and butter?"

T: "Dairy products."

T: "Can you put all pictures which have flowers in one pile and all the pictures which have animals in another?"

St: (Does so.)

5.3.3 Explain

St: "Why does it get dark sometimes during the day?"

T: "Because the clouds block the sun."

St: "When I let go of this book it falls down. How come?"

T: "Because a little man pulls it down."*

T: "What does friendship mean?"

St: "Friendship is when you can think and feel aloud when you are with someone."

T: "What is multiplication?"

St: "When I take a number so many times, for instance, when I take '4' three times."

*Here too, the answer is incorrect but it is an attempt to explain, therefore code it as an Hierarchical Relating response.

5.4 Notes

5.4.1 Do not confuse Hierarchical Relating with Recall.

St: "Would you explain to me what the lion did to the little mouse in the story?"

T: "Well, the tiger got caught caught in a trap, and . . . etc."

St: "Can you explain what the word 'ambiguous' means?"

T: "That you are not sure whether it is one way or another."

T: "Mary, how was the castle described in the story?"

St: "It was big and had a lot of towers. It also had wide wooden stairs inside and many rooms and it had a drawbridge."

↓

Facts have to be simply recalled. So, it is . . .

T: "Mary, can you find one word to describe the concepts: cottage, castle, house?"

St: "Homes, or dwelling places."

↓

Facts have to perceived or recalled and then related to one another. So, it is . . .

5.4.2 Do not confuse Hierarchical Relating with Discrimination.

T: "Can you describe the tiger you see in the picture?"

St: "It's like a big cat--yellowish and it has stripes."

T: "Can you sort out the pictures with the dog from the pictures with the rose?"

St: (Does so.)

↓

The facts are in front of the student to be perceived. Only a simple response is required. So, it is . . .

T: "What is it that tigers have that makes them different from lions?"

St: "Tigers have stripes and lions don't."

T: "Can you put all pictures which have animals in one pile and all pictures which have flowers in another?"

St: (Does so.)

↓

Facts cannot only be perceived or recalled: they have to be related to one another in some way. So, it is . . .

5.4.3 Don't jump to conclusions when you see words such as describe and explain. These words often introduce a Hierarchical Relating question, but not necessarily so. You need to pay attention to what cognitive function the question demands, for example:

"How would you describe what you see in this picture?"

"Can you describe the building for me?" (no picture is available)

"How would you describe what 'grief' means?"

"Can you explain what this building looks like in the picture?"

↓

All that is required is to describe what is seen. The facts are in front of the person to be perceived. So, it is . . .

"Would you explain what the buidling we saw yesterday looked like?"

↓

The facts cannot be perceived but have to be recalled from memory. What is required is to list facts. The responder is not asked to act upon the recalled information. So, it is . . .

"How would you explain the word 'verdict'?"

↓

Recall is involved but the responder has to act upon the recalled information by relating the facts to each other. So, it is . . .

5.5 Exercises

5.5.1 Consider each question-response event and fill in:

Examples of category 5.					The correct code is:
yes__ no__	a)	St:	"What's that in the boy's hand?" (pointing to a picture.)		- -
yes__ no__	b)	T:	"A hammer."		- -
yes__ no__	c)	T:	"What is fruit?"		- -
yes__ no__	d)	St:	"Fruit are things you can eat which are not dairy products, meats, vegetables or grains; things like apples, oranges, plums, peaches."		- -
yes__ no__	e)	T:	"Can you put all the cards with the word 'milk' in them here, and the cards with 'cheese' on them over there?"		- -
yes__ no__	f)	St:	(Does so.)		- -
yes__ no__	g)	T:	"Ann, tell me about your plane ride, what all did you see?"		- -
yes__ no__	h)	St:	"Oh, I saw the houses and roads becoming real tiny and then they disappeared; and we saw clouds close by."		- -
yes__ no__	i)	St:	"How are these letters different?"		- -
yes__ no__	j)	T:	"They are not the same."*		- -

Answers:

a) no; $\underline{3}\ \underline{2}$ b) no; $\underline{4}\ \underline{2}$ c) yes; $\underline{1}\ \underline{5}$ d) yes; $\underline{2}\ \underline{5}$ e) no; $\underline{1}\ \underline{2}$
f) no; $\underline{2}\ \underline{2}$ g) no; $\underline{1}\ \underline{4}$ h) no; $\underline{2}\ \underline{4}$ i) yes; $\underline{3}\ \underline{5}$ j) no; $\underline{4}\ \underline{2}$

*This is another case where the student's answer is at a different level than the teacher's question.

5.5.2 Make up 4 examples of category 5. (The student does not necessarily have to give a category 5 answer.)

Compare: T: "
" "
St: " "
" "

Categorize: T: ""
" "
St: " "
" "

Explain: St: " "
" "
T: " "
" "

Define: T: " "
" "
St: " "
" "

Category 6 - Inference

6.1 Definition

Antecedent facts are used to predict a logical continuation of trends or consequences by choosing between a number of logical possibilities.

6.2 Extension of definition

The content of the appropriate response requires the student to predict a logical continuation or extension from information contained in the question. The response to an inference question is not directly given in the lesson, therefore, the response cannot be simply perceived, recalled, or found through relating facts.

Rather, the student has to make a logical step within the limits of possible responses. A "logical guessing" is involved. The student does not have to construct new knowledge but rather select from logical possibilities in reaching a conclusion. Often, but not always, inference questions refer to a specific situation. Typically, inference questions ask for:

(1) What might happen (after an event)

(2) What might have happened (before an event)

(3) Other person(s) motivations for a particular act (why would s/he do that, or have done that)

(4) The consequences of hypothetical situations (what would happen, or have happened, if . . .)

6.3 Examples

T: "What do you think happens on the next page?

St: "I think, the bear might attack the hunter, or, perhaps, the bear might run away."

St: "What could Jonathan's father have said that made Jonathan so sad?"

T: "Perhaps he said that he did not love Jonathan anymore."

T: "Why do you think your mother read the newspaper last night?"

St: "Because she wanted to find about that hijacked plane."

T: "What would happen if all of a sudden all people decided not to work anymore?"

St: "We'd all die after a while!"

6.4 Notes

6.4.1 Do not confuse Inference with Explanation.

T: "Why do cars break down?"	T: "Why do you think John's car broke down?"
St: "They can be too old, or the owner did not take care of it, or it is just a bad car."	St: "John had been driving his car for more than a year without taking care of it."
T: "What makes it rain?"	T: "What would happen if it rains for two weeks?
St: "Angels are throwing buckets of water on the earth." (Incorrect, but it is an explanation.)	St: "All my shoes would be soaking wet, because they did not have a chance to dry--and the rivers might overflow."
↓	↓
The student has to verbalize what s/he already knows and explain a general state of affairs by relating facts. So, it is . . .	The student has to infer what might have happened or has to look forward into the--hypothetical--future and predict what might happen in a specific context. So, it is . . .

6.4.2 Do not confuse Inference with Discrimination or with Sequencing/ Paraphrasing.

T: "In this picture did Sue hit John?"	T: "Why do you think Sue might have hit John?"	T: "What happened before Sue hit John?"

St: "Yes."

The stimuli are in front of the student to be perceived. The student does not have to act upon the information.

St: "Perhaps, John had taken her pencil away or something."

Another person's motivation has to be inferred. So, it is . . .

St: "Well, first Sue started whispering to Paul, then she . . . etc."

Events have to be ordered in time. So, it is . . .

6.4.3 Do not confuse Inference with Recall.

T: "What happened to make Donna leave home?"

St: "Her mother was mad."

Information required has to be pulled from memory. So, it is . . .

T: "What might Donna's mother have said to make her leave home?"

St: "Perhaps she said, 'I hate you. I don't want you here anymore.'"

Information required is not in memory and has to be logically deduced. So, it is . . .

6.5 Exercises

6.5.1 Make up one T question and St response belonging in the Inference cate
category. Then transform the Inference question-response event into a Discrimination, Recall, Sequence/Paraphrase, and a Compare/Categorize/Explain/Define question-response.

Inference: T: " "

St: " "

Discrimination: T: " "

St: " "

Recall:	T:	"	"
	St:	"	"
Sequence/ Paraphrase:	T:	"	"
	St:	"	"
Hierarchical Relating:	T:	"	"
	St:	"	"

6.5.2 Do the same for a St question and a T response.

Inference:	St:	"	"
	T:	"	"
Discrimination:	St:	"	
	T:	"	"
Recall:	St:	"	"
	T:	"	"
Sequence/ Paraphrase:	St:	"	"
	T:	"	"
Hierarchical Relating:	St:	"	"
	T:	"	"

Category 7 - Problem Solving

7.1 Definition

Known facts are used in new combinations, or new knowledge is constructed to solve a puzzling situation.

7.2 Extension of Definition

The content of the appropriate response must be a possible solution to the problem or puzzle. The student has to understand and analyze the information stated in the problem. However, no direct cues are provided to guide the formation of the response: the student has to construct new knowledge in doing so. The student has to decide on his/her own, how to proceed in solving the problem. A problem solving question is often posed directly at the person who is to respond: "What would you do . . .?," and puts the responder in an active position. The responder is asked to imagine playing an active part in finding a solution to the stated problem.

7.3 Examples

T: "Can you think of new ways to earn money?"

St: "You could start doing grocery shopping for people and go to the stores where there are sales on, and then you could keep money you had saved that way.

St: "We have to stop this cat from jumping on the table while we are eating. I don't want to spank her. What else do you think we can do?"

T: "Hm. I don't know. Well, perhaps we can put food on the floor for her while we eat, or put her outside every time she jumps on the table, or tie her to a chair."

7.4 Notes

7.4.1 Do not confuse Problem Solving with Inference.

T: "What would you do in such a situation?"

St: "I probably would cry!"

St: "How would you fix the TV?"

T: "Put a new lamp in."

T: "How would you fix that broken bike?"

St: "I don't know--perhaps it can't be fixed anymore."

↓

A puzzling situation is presented and the responder has to imagine himself or herself how s/he would go about finding a solution. The responder is asked to play an imaginary active part. So, it is . . .

T: "Why do you think John started crying?"

St: "Perhaps he thought that his father would give in."

St: "Why doesn't the TV work?"

T: "I think the lamp is broken."

T: "Why do you think Sue would have wanted to fix the broken bike?"

St: "Probably, because she knows that without a bike she would have to walk to school, and that would be a long walk."

↓

The response requires the responder to infer what another person's reason for a particular act could be, or could have been. Or, the student has to infer what might have happened. The responder is not asked to play an active part, but merely to be a spectator making an inference. So, it is . . .

7.5 Exercises

7.5.1 Fill in the correct codes for the questions. Write in answers, matching the codes provided.

a) T: "If you want to go to the circus, how could you earn enough money to pay for the ticket?"

St: " _ _

" 2 7

b) St: "How would you define the word 'happy'?"

T: " --

" 4 5

c) St: "How could you train a dog to do tricks?"

T: " --

" 4 3

d) St: "What would you do to teach a young child to tie his shoes?"

T: " --

" 4 7

e) T: "What is the difference between a cat and a dog?"

St: " --

" 2 3

f) St: "How would you convince your mother to let you go to the movie?"

T: " --

" 4 6

Answers:

a) 1 2 b) 3 5 c) 3 2 d) 3 2 e) 1 5 f) 3 2

7.5.2 Create a script of St or T questions and T or St responses, containing at least 3 Problem Solving questions and 3 Problem Solving responses.

T:

St:

etc.

CRITICAL ATTRIBUTES	CATEGORIES	Discrimination	Recall	Sequencing/ Paraphrasing	Hierarchical Relating	Inference	Problem Solving
		Facts have to be perceived by the senses.	Facts have to be recalled from memory.	Facts have to be perceived or recalled and ordered in time.	Known facts have to be perceived or recalled and related to one another in a hierarchical fashion.	Antecedent facts are used to predict a logical continuation of trends or consequences by choosing among a number of logical alternatives.	Known facts are used in new combinations, or new knowledge is constructed to solve a puzzling situation.
Facts have to be perceived by the senses.		X		O	O	O	O
Facts have to be recalled from memory.			X	O	O	O	O
Facts have to be perceived or recalled and ordered in time.				X	O	O	O
known facts have to be perceived or recalled and related to one another in a hierarchical fashion.					X	O	O
Antecedent facts are used to predict a logical continuation of trends or consequences by choosing among a number of logical alternatives.						X	O
known facts are used in new combinations, or new knowledge is constructed to solve a puzzling situation.							X

X = critical attribute: Characteristic shared by all questions and responses coded in that category. X respresents the essential criteria for membership in that category.

O = irrelevant attribute: Characteristics which are shared by some but not all questions and responses in that category. The category may or may not have characteristic O.

The preceding chart indicates that (1) categories may or may not include characteristics of categories with lower numbers, and (2) you should not jump to conclusions if you recognize a characteristic of a category. For instance, higher number categories often do include recall, but they demand a cognitive functioning over and beyond recall. Likewise, don't jump to conclusions if one of the time ordering words (last, next, before, etc.) is part of the question: it is not automatically a Sequencing/Paraphrasing question, for example:

T: "Which lights went first?"

St: "The lights in the bedroom."

↓

What is required is to order events in time. So, it is . . .

T: "Did the lights go out?"

St: "Yes."

↓

All that is necessary is to recall a simple fact. No further action is required. So, it is . . .

T: "What would you do if the lights went out first?"

St: "Get a flashlight and look for candles and matches."

↓

A time-ordering word is included, however, the cognitive demand goes over and beyond sequencing, the responder is asked to imagine playing an active part in solving the problem. So, it is . . .

Category 8 - Talk

8.1 Definition

Talk is defined as teacher or student cognitive demands or other verbal interactions which cannot be categorized in any of the other categories.

8.2 Extension of Definition

Talk includes: value judgements (opinions), rhetorical questions, procedural information questions, habitual responding, and any type of talk which does not require an overt response.

8.3 Examples

8.3.1 Value judgements - opinions

T: "Did you like this story?"

St: "Not really."

8.3.2 Rhetorical questions - these questions do not require a cognitive demand. The answer is given in the question.

T: "Choice A is the right answer, isn't it?"

8.3.3 Procedural information questions

T: "Do you want to color with a blue or a red pencil?"

St: "A red one."

T: "Did you bring your library money, John?"

St: "Yes, here it is."

St: "Are you sure?"

T: "Sure."

T: "Do you think so?"

St: "Yes."

8.3.4 Habitual responding

T: "Repeat after me."

8.3.5 Any type of talk which does not require an overt response such as lecturing, feedback, procedural, commanding or expanding on a response, and requests to read:

T or St: "Let's go on . . ."

"Tell me what this word is."*

". . . and this one . . ."

". . . and this one . . ."

It regularly happens that a teacher (or a student) first gives information before asking a question. For example:

T: "John, let's look at this now, this picture in this book, right here. Can you tell what this figure is?"

The first sentence is quite substantial and provides enough time to code *n* 1-8. The codes for the entire verbal expression would be: 1-8 send/ 1-2 send.** If only a few words are said before the actual question is asked, and/or are spoken very fast, thereby distracting you from concentrating on coding the question, only code the question.

It is important to code a 1-8 or a 2-8 as soon as talk occurs, as it helps to account for the time spent in the tutoring sessions.

*The responder is required to make a discrimination, however, the verbal expression is not a question, as grammatically, it does not have a question mark. (See pages 4 and 5.)

**On page 14 (4.4.2), and page 10, you find examples of talk before the actual question.

Categories [5] and [6]

Category [5]

Examples: "No," "I don't know," "I won't," No response.

Category [6] - Not codable

Non verbal events are coded "not codable." Examples are behaviors, such as generalized disturbances, distraction, cutting, pasting, coloring, interruptions by others, leaving the room, confusion or silence, writing words, and the like.

It is important to code the 6 as soon as it occurs, as it helps to account for the time spent in the tutoring session.

Categories [5] and [6]

Category [5].

Examples: "No," "I don't know," "I won't," No response.

Category [6] - Not codable

Non verbal events are coded "not codable." Examples are behaviors, such as generalized disturbances, distraction, cutting, pasting, coloring, interruptions by others, leaving the room, confusion or silence, writing words, and the like.

It is important to code the 6 as soon as it occurs, as it helps to account for the time spent in the tutoring session.

Ground Rules and Notes

1. Let the context of the lesson guide you. At times, a question might look like a 4, 5, 6, or 7 question, while the answer has just been given, or read during the tutoring sessions. In that case you code Recall.

2. Try to code every response, even if a series of responses is given to one question.

3. If a teacher asks more than one question without providing an opportunity for the student to respond to each question, code only the question the student does respond to.

4. When the "Oh's," "I see's" and "Hmm's," etc., are distracting for coding other categories, neglect these.

5. If the shifting from verbal interactions (8) to non-verbal interactions (6) is too fast, then code only the significant shifts.

6. When the time period after you code "5" for no response becomes substantial, then code a non-codable (6) until verbal interaction resumes.

7. A non-verbal response (sorting out, pointing to, picking up) is coded as a response if it is the response the preceding question asked for.

8. In the manual, most responses are more or less correct except for the obvious incorrect responses on pages 17, 18, and 20. It is important to realize that we are not interested in knowing whether an answer is correct or incorrect. All we are interested in is the kind of cognitive process required to respond to a question. So, a response can still fall in the category as the preceding question even if the response

is clearly incorrect.

9. It is also important to realize (so you don't get confused) that we are not interested in the level of difficulty. Higher level questions, often are, but do not necessarily have to be more difficult. A Discrimination question can be difficult (e.g., sounding out letters or words), so can a Recall question ("What is the chemical formula for water?")! An Inference question, on the other hand, can be easy ("What would happen if you spill a glass of milk on the table?") so can a Problem Solving question ("What would you do if the phone rings?").

APPENDIX G

Lesson Plan Format and Rating Scale

Module 2

Writing Lesson Plans - Required Guidelines

The present contains descriptions of the items to be included in preparing your lesson plans. Since they are arranged in logical order for the development of lesson plans, it is a good idea to check the items and write your lesson plan in the order in which they are given. If you use this as a standard format in the preparation of your lesson plans, it will facilitate evaluation and also make the feedback more meaningful for you.

In addition, you will find a copy of the evaluation sheet that will be returned to you each time you submit a lesson. The scale used on the evaluation sheet is for your guidance in interpreting the evaluation - the scale points are <u>not</u> grades and will not be used as such.

CHECKLIST FOR WRITING LESSON PLANS

1. THE ENTRY TEST:

The entry test should check the prerequisite skills the pupil needs in order to understand your lesson. If no special prerequisite skill is needed, mention that in your lesson plan. If the lesson objective is to teach the pupil how to write his name, you would expect him to know how to write the letters of the alphabet. Your entry test will check if the pupil knows how to write different letters. The entry test does <u>not</u> test the attainment of the lesson objectives.

2. TASK ANALYSIS:

The next and the most important step is a task analysis. Of course, your lesson plan need not contain the task analysis, but unless you do it, your subobjectives may turn out to be irrelevant and your lesson plan incomplete.

2.1 <u>The Main Task is Analyzed up to Entry Level</u>:

If the main task is to copy a sentence, the subtasks could be:

1. Begin the first word with a capital letter,
2. Leave small space between letters in a word,
3. Leave more space between words, and
4. Place a period at the end of the sentence.

We need not include the task of writing the letters as this is a part of the entry behavior and checked by the entry test.

2.2 There is no Unnecessary Subtask:

If the main task is for the pupil to write the name of his neighbor, do not ask the pupil to draw his neighbor's face and name him. Asking the pupil to draw may be a good idea to keep the child busy, but it is not a necessary subtask in order to perform the main task.

2.3 There is no Trivial Subtask:

If the objective includes pupils' copying a sentence, do not include such subtasks as "the child writes from left to right" unless you have a very strong reason to suspect that the pupils have to be taught this.

2.4 The Subtasks are Arranged in Suitable Sequence:

In the example in item 2 the exact sequence of teaching is not important. But in some tasks mastering one subtask is necessary before the pupil can master another subtask. In such cases, arrange the subtasks in the correct sequence.

3. MAIN AND SUBOBJECTIVES:

The task analysis is transferred to the lesson plan in the form of subobjectives. Write a subobjective for each subtask you have identified. Use the items 3.1 to 3.5 below to check your main objective and each of your subobjectives.

3.1 The Objectives are Specified in Performance Terms:

"Know," "grasp" and "understand" are nonbehavioral terms which should not be used in writing these objectives. You may find the ALPHABETICAL LIST OF PERFORMANCE TERMS useful. (pg. 5)

3.2 The Objectives Contain Suitable Performance Range:

Range indicates variations in the question asked of the child. "Discriminate between the sounds of different letters" does not contain the range. You will have to expand it to "Discriminate between the sounds of p, k, n, t and d."

3.3 The Objectives Contain Performance Conditions:

You will have to specify what help is to be given to the child. If Johnny may look at his name written on the chalk board and copy it, or if you will help him when he has difficulty, specify this as a part of your objective. If not, say "without help."

3.4 The Objectives Contain Suitable Time Limit:

This is the amount of time you give Johnny to write his name (e.g., "within two minutes"). This time limit is not to be confused with the thirty minutes class time for the entire lesson.

3.5 The Objectives Contain Suitable Performance Standards:

If you want the pupil to perform without any error, write "without any mistake," or "with 100% accuracy." If you do not expect such perfection write "9 out of 10 items" or some other suitable standard. Another type of standard is to specify what the response should be. You want Johnny to use capital J, and you will not accept any spelling mistake; but you do not mind if Johnny's writing is not perfect, as long as it is legible.

4. CRITERION TESTS FOR MAIN AND SUBOBJECTIVES:

No doubt your criterion test is built into your classroom activity. But the activities are planned on your criterion test and not the other

way round. Therefore, please write them seperately from your instructional activities.

4.1 The Test is a Valid Measure of the Objective:

If Johnny is to write his friend's name, teach him to draw his friend's picture and name it, if you want to. But do not build a criterion test around drawing pictures. The criterion test measures the objective, nothing more and nothing less.

5. TEACHING STRATEGIES:

The following items are often a matter of individual judgement and intuition. Similarly, evaluations may be subjective. Keep this in mind when reacting to the evaluations.

5.1 The Instructional Materials Used are Appropriate to the Objective:

5.2 The Instructional Activities are Relevant and Appropriate to the Criterion:

5.3 The Overall Layout is Done with Care:

5.4 Lessons are Well Planned for the Period of Activity:

ALPHABETICAL LIST OF PERFORMANCE TERMS

build

change
classify
color
combine
compare
complete
count

discriminate
distinguish
draw

explain

fill in
finish

give

identify
imitate

keep

label
list
locate

make
match

name

organize

plan

question
quote

read
recall
recognize
restate

say
select
spell
state

tell
test

underline
use

write

K495 Spring, 1976
Dr. Sitko

NAME_____ DATE_____ Lesson No._____

CHECKLIST FOR LESSON PLAN EVALUATION

	NO 1	2	3	4	YES 5
1. Entry Test					
1.1 The entry test is suitable for the entry level of the target student.	1	2	3	4	5
1.2 The entry test excludes the lesson objectives.	1	2	3	4	5
2. Task Analysis					
2.1 The main task is analyzed into simple subtasks.	1	2	3	4	5
2.2 There are no unnecessary subtasks.	1	2	3	4	5
2.3 There are no trivial subtasks.	1	2	3	4	5
2.4 The subtasks are arranged in suitable sequence.	1	2	3	4	5
3. Objectives					
3.1 The objectives are specified in performance terms.	1	2	3	4	5
3.2 The objectives contain a suitable performance range.	1	2	3	4	5
3.3 The objectives contain performance conditions. (equipments, aids, etc.)	1	2	3	4	5
3.4 The objectives contain suitable time limits.	1	2	3	4	5
3.5 The objectives contain suitable performance standards.	1	2	3	4	5

(OVER)

	No YES
	1 2 3 4 5
4. Criterion test for main and subobjectives	
4.1 The test is a valid measure of the objective.	1 2 3 4 5
5. Teaching Strategies	
5.1 The instructional materials used are appropriate to the objective.	1 2 3 4 5
5.2 The steps in teaching are relevant to the criterion.	1 2 3 4 5
5.3 The overall layout is done with care.	1 2 3 4 5
5.4 Lessons are well planned for the period of activity.	1 2 3 4 5

APPENDIX H

Pre-Post Standardized Assessment of Pupils

Pupil 01

I. Math

A. Key Math

Pre	Post
-	2.1 + symbols, add., subt., time - mult., wd. problem

B. WRAT

Pre	Post
2.1	2.2

II. Reading

A. Survey of Primary Reading

	Pre	Post
Form comparison	6	6
Word form comparison	14	14
Word recognition	17	17
Sentence recognition	5	8
Sentence comprehension	6	9
Story comprehension	0	19

Pre - range of basic vocabulary in sentences
Post - comprehends directly stated facts (not yet ready for inferences)

B. WRAT

	Pre	Post
Spelling	2.2	2.9
Reading	2.6	3.0

C. Dolch Word List

Pre	Post
184	220
83%	100%

D. Gates-MacGintie

	Pre	Post
Vocabulary	2.3	2.3
Comprehension	1.4	2.2

E. PPVT

	Post
Percentile	1%
IQ	65

Pupil 02

I. Math

	Pre	Post
A. Key Math	3.1	3.7
B. WRAT	2.6	3.6

II. Reading

A. Survey of Primary Reading	Pre	Post	Max
Form comparison	10	11	12
Word form comparison	10	14	14
Word recognition	11	17	17
Sentence recognition	6	8	8
Sentence comprehension	4	6	9
Story comprehension	18 read to	14	indep. 28

Pre - basic vocabulary and use of vocabulary in sentences
Post -

B. WRAT	Pre	Post
Reading	1.6	1.8
Spelling	1.4	1.5

C. Dolch Word List	Pre	Post
	53	105
	24%	48%

D. Gates-MacGintie	Pre	Post
Vocabulary	1.6	1.6
Comprehension	1.5	1.6

E. PPVT	Post
Percentile	6%
IQ	80%

F. Alphabet ID	Pre	Post
	100%	100%

Pupil 03

I. Math

A. Key Math	Pre	Post
	-	3.9

B. WRAT	Pre	Post
	2.4	3.2

II. Reading

A. Survey of Primary Reading	Pre	Post	Max
Form comparison	12	12	12
Word comparison	14	14	14
Word recognition	11	14	17
Sentence recognition	6	8	8
Sentence comprehension	6	7	9
*Story comprehension	12	18	28

*All stories read to him
Pre and post in area of use and meaning of words in context

B. WRAT	Pre	Post
Reading	wouldn't attempt	2.3
Spelling	1.5	1.5

C. Dolch Word List

D. Gates-MacGintie	Pre	Post
Vocabulary	1.5	1.6
Comprehension	1.6	1.5

E. PPVT	Post
Percentile	3%
IQ	72

F. Alphabet ID	Pre	Post
	100%	100%

Pupil 04

I. Math

A. Key Math	Pre	Post
	-	4.2

B. WRAT	Pre	Post
	3.6	4.2

II. Reading

A. Survey of Primary Reading	Pre	Post	Max
Form comparison	12	11	12
Word comparison	14	14	14
Word recognition	16	16	17
Sentence recognition	8	7	8
Sentence comprehension	8	8	9
Story comprehension	11	21	20

Pre - use and meaning of words in context
Post - comprehends directly stated facts

B. WRAT	Pre	Post
Reading	2.3	2.4
Spelling	1.8	2.9

C. Dolch Word List	Pre	Post
	159	190
	72%	86%

D. Gates-MacGintie	Pre	Post
Vocabulary	1.6	2.0
Comprehension	1.4	2.1

E. PPVT		Post
Percentile		12%
IQ		82

F. Alphabet ID	Pre	Post
	100%	100%

Pupil 05

I. Math

	Pre	Post
A. Key Math	2.0	2.5
B. WRAT	2.8	3.2

II. Reading

	Pre	Post
B. WRAT		
Reading	1.5	1.5
Spelling	1.2	1.6
C. Dolch Word List	44	69
	20%	31%
D. Gates-McGintie	Pre	Post
Vocabulary	no attempt	1.6
Comprehension	no attempt	1.5
E. PPVT		Post
Percentile		5%
IQ		77
F. Alphabet ID	Pre missed	Post missed
	d, v, h, j, a, g, H, J, V	G, Y, J

Pupil 06

I. Math

A. Key Math	Pre	Post
	2.8	4.8

B. WRAT	Pre	Post
	3.9	4.2

II. Reading

A. Survey of Primary Reading	Pre	Post	Max
Form comparison	12	11	12
Word comparison	12	14	14
Word recognition	16	17	17
Sentence recognition	8	8	8
Sentence comprehension	8	8	9
Story comprehension	3	22	28

Pre - basic vocabulary and use of vocabulary in sentences
Post - comprehends directly stated facts

B. WRAT	Pre	Post
Reading	1.8	2.3
Spelling	1.5	2.3

C. Dolch Word List	Pre	Post
	137	157
	62%	71%

D. Gates-MacGintie	Pre	Post
Vocabulary	1.7	2.2
Comprehension	1.4	1.6

E. PPVT		Post
Percentile		6%
IQ		76

F. Alphabet ID	Pre	Post
	100%	100%

Pupil 07

I. Math

	Pre	Post
A. Key Math	-	-
B. WRAT	Pre	Post
	-	-

II. Reading

	Pre	Post
B. WRAT	-	-
C. Dolch Word List	Pre	Post
	38	-
	17%	-
D. Gates-MacGintie	Pre	Post
Vocabulary	1.3	2.2
Comprehension	1.6	1.7
E. PPVT		Post
Percentile		-
IQ		-
F. Alphabet ID	Pre	Post
	-	-

Letter recognition: confuses Y, U, S, C

Nota Bene: Richard was withdrawn from the school as of May 2nd.

Pupil 08

I. Math

	Pre	Post
A. Key Math	1.4	1.9
B. WRAT	2.2	2.8

II. Reading

	Pre	Post
B. WRAT		
Reading	1.3	1.5
Spelling	1.2	1.5
C. Dolch Word List	22	36
	10%	16%
E. PPVT		
Percentile		1%
IQ		73
F. Letter recognition	100%	
G. Boehm prob. concepts	between	
	whole	

Pupil 09

I. Math

A. Key Math

Pre	Post
0.0	0.3

B. WRAT (K-A)

II. Reading

B. WRAT

Reading	1.6
Spelling	K-1

C. Dolch Word List

Pre	Post
36	44
16%	20%

E. PPVT

	Post
Percentile	0%
IQ	57

F. Letter recognition

Pre	Post
-	did not know r, q

G. Boehm prob. concepts

through	few	between	behind
next to	widest	second	row
inside	most	several	after

H. Pupil can now follow verbal directions and use simple answer sheets.

Pupil 10

I. Math

A. Key Math	Pre	Post
	NA	4.0

B. WRAT	Pre	Post
	4.2	4.7

II. Reading

A. Survey of Primary Reading	Pre	Post	Max
Form comparison	12	10	12
Word comparison	14	14	14
Word recognition	13	16	17
Sentence recognition	7	7	8
Sentence comprehension	8	5	9
Story comprehension	6	18	28

Pre - use and meaning of words in context

B. WRAT	Pre	Post
Reading	1.6	2.1
Spelling	1.5	1.8

C. Dolch Word List	Pre	Post
	96	120
	44%	55%

D. Gates-MacGintie	Pre	Post
Vocabulary	1.5	1.7
Comprehension	1.6	1.4

E. PPVT		Post
Percentile		5%
IQ		79

F. Alphabet ID	100%

APPENDIX I

Module 3-A

Interpretation of Printout Feedback w/Scope

K495 Practicum in Reading

As indicated in Module 1, the CATTS system of teacher training is designed to provide the teacher trainee with objective information about his/her individual pattern or use of different teaching strategies during a given lesson. The system uses trained classroom observers to code lessons. The data they obtain is transmitted to the computer in "real time" (as soon as it is mechanically punched in on the button-box). The computer then transmits the information obtained from the coder into a data storage file for later use, or it analyzes the data and feeds it back to the teacher - also in "real time."

In the present use of CATTS, we shall use the computer to perform both these functions. The data that is stored will be retrieved and printed out so that each teacher can review it and have an objective picture of his/her individual use of different teaching strategies (represented by each of the categories on the Teacher Pupil Question Response System.

You are to employ this printout feedback for analyzing pupil responses and your questioning strategies, and then use the resulting analysis to formulate goals for your next lesson.

Your first major form of feedback for this practicum is CATTS scope feedback. A monitor will be placed in your tutoring booth. (See Figure 1 for a diagram of scope feedback.)

As you tutor, the scope monitor will give you instantaneous feedback on the number and types of questions you have asked. Also, the number of appropriate pupil responses will be shown. (See Module IV for a complete explanation of how the scope works.) There will be a moving arrow under the abbreviations for the levels. The arrow will point to the cognitive level at which you should be questionning at that point in the lesson. (Page 3 of Module IV gives the rules for arrow movement.) After you successfully complete that cognitive level by asking an appropriate question and receiving an appropriate pupil response, the arrow will move to the next indicated question level.

EXAMPLE OF CATTS PRINTOUT SHEET

TFQR
K495

1) Teacher: _____ Date: _____

2) Pupil: _____ Time: _____

Session length: _____

Teacher
Question

2) level	9) Freq.	10) %Freq.	11) Freq. Bar Graph (#=7; *=App. Res.) 0 10 20 30 40 50
3) DSC	X	X	####
4) REC	X	X	***
5) S-P	X	X	######
6) HR	X	X	**
7) INF	X	X	
8) PS	X	X	

12) Percent Teacher Questions = xx%
13) Percent high level teacher questions over the total questions asked = xx%
14) Percent high level pupil responses over the total responses given = xx%
15) Matrix 1: Teacher questions by indicated question level

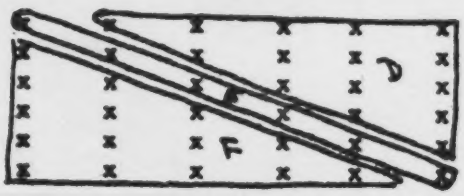
TCHR 16) Indicated question level

QUES.	DSC	REC	S-P	HR	INF	PS	Total
DSC	x	x	x	x	x	x	x
REC	x	x	x	x	x	x	x
S-P	x	x	x	x	x	x	x
HR	x	x	x	x	x	x	x
INF	x	x	x	x	x	x	x
PS	x	x	x	x	x	x	
Total	x	x	x	x	x	x	x

17) Total teacher questions = _____
18) Percent appropriate matches = _____
19) Percent questions - higher than indicator = _____
20) Percent questions - lower than indicator = _____

21 Matrix 2: Teacher questions by pupil responses

TCHR. / QUES.	DSC	REC	S-P	HR	INF	PS	Total
DSC	x	x	x	x	x	x	x
REC	x	x	x	x	x	x	x
S-P	x	x	x	x	x	x	x
HR	x	x	x	x	x	x	x
INF	x	x	x	x	x	x	x
PS	x	x	x	x	x	x	x
Total	x	x	x	x	x	x	x



22 Total teacher question-pupil responses = _____
23 Percent appropriate matches = _____
24 Percent questions higher than response = _____
25 Percent questions lower than response = _____

26 TPQR Interaction Sequence Summary

Frequency Distribution of Interaction Strings

1	2	3	4	5	6	7	8	24
x	x	x	x	x	x	x	x	

27 Mean string = _____
28 Median string = _____
29 S.D. of string = _____

30 Number of strings = _____
31 Number of completed sequences (to PS) = _____
32 Percent completed sequences (to PS) = _____
33 Number of codes = _____

Indicated level	34 Interaction Strings							
2)	50	32	42	T3	50	T2	P2	
3)	18	33	44	60	T2	P2	T3	P3
4)								
"								
"								
"								
"								
"								
"								

Module III K495 Dr. Sitko

CATTS Printout Key

(1) Status data: This information identifies the printout by telling the reader who did the tutoring (teacher), who was tutored, (pupil), on what day (date), at what time (time), and for how long (session length).

(2) Teacher Question Level: Teacher questions are characterized as a continuum ranging from lower level to higher level depending on the cognitive processes that the question requires one to use in formulating an answer. (See Module 2)

(3) DSC: Discrimination

(4) REC: Recall

(5) S-P: Sequencing - Paraphrasing

(6) HR: Hierarchical Relating

(7) INF: Inference

(8) PS: Problem Solving

See module 2 for a complete definition of these levels numbers (3) - (8).

(9) FREQ: This column indicates the number of times each level of question is asked by the teacher.

(10) %FREQ: This is frequency divided by the total number of questions. (see number 17 for the total number of questions)

(11) FREQ. BAR GRAPH: This is a graph of the number of teacher questions at each cognitive level (designated by #) in the TPQR Observation System, and the number of pupil responses at the same cognitive level as the question asked (designated by *). Please note that pupil responses on a cognitive level different from that of the question asked are not shown on the bar graph.

*(12) Percent teacher questions: The % of TQ is the number of questions the teacher asked divided by all teacher behavior(-that is, the sum of all

teacher questions plus all teacher responses to pupil questions plus all other teacher talk (See TPQR Observation System). * Your first major goal for the practicum is to keep your percent teacher questions between 30% to 50%/

**(13) Percent high level teacher questions over the total questions asked: High level teacher questions include Sequencing Paraphrasing, Hierarchical-Relating, Inference and Problem Solving. **Your secondary major goal is to maximize the percentage of High Level Questions you ask relative to the percentage of Low Level Questions asked (e.g., Discrimination and Recall Questions.)

(14) Percent high level pupil responses over the total responses: High level responses include Sequencing-Paraphrasing, Hierarchical-Relating, Inference and Problem Solving.

(15) Matrix 1: Teacher questions by indicated question level: See 16-20.

***(16) Indicated Question Level: Your third major goal in your tutoring is to develop the skills required to ask in sequential order the total hierarchy of six questions on the TPQR system and receive appropriate pupil responses. to each of these types of questions. To achieve this goal in each lesson you must ask questions beginning at the lowest cognitive level (discrimination) and sequentially continue up the hierarchy to the highest level (Problem Solving).

In order to help your pupil develop higher cognitive processes, you should lay an appropriate foundation for the pupil. This can be achieved by starting out on the lesson content asking discrimination questions and getting the appropriate responses from the pupil. You should continue asking questions at the discrimination level until the pupil gives the desired response. Similarly, you should follow this procedure at each level on the

TPQR system as indicated by the arrow on the CATTS Scope. For example, assume the pupil is in the middle of reading a story, you may ask pointing to a picture "What is the lion doing in this picture?" (a discrimination question) Continue here until you are confident that the pupil understands your question and gives an appropriate discrimination response. Then ask the pupil to recall what happened on the preceding page (a recall question). Continue in the manner described above, then aske the pupil to retall the story up to that point in his/her own words (sequencing-paraphrasing question). Continue as above, then ask the pupil to explain why it rains (raining in the picture) (a hierarchical-relating question) then ask the pupil what he thinks would happen if the lion left the forest and went to live in the zoo. (an inference question) Finally, as the arrow moves to problem solving, akd the pupil what would she do in a new place to make new friends. Please note that if you think your pupil is not following the lesson plan, do not be afraid to drop back to a lower cognitive level in order to help your pupil to a better understanding of the story.

In examining Matrix 1, the most important feature to note is the diagonal as indicated by segment B. This diagonal will show you the number of "hits" that you have made. A "hit" occurs each time you ask a question at the same level indicated by the arrow on the CATTS scope.

Segment A gives you the instances where the indicated question level on the CATTS scope was higher than the actual question asked. For example, if the indicated question level is Sequencing-Paraphrasing and you ask a discrimination question, then a "miss" will occur in segment A. (A "miss" means you have not asked a question at the indicated question level).

Similarly, segment C gives you the instances where the indicated question level was lower than the actual question asked. For example, if the indicated question level is sequencing-paraphrasing and you ask an Inference question,

then a "miss" will occur in segment C.

(17) Total teacher questions: = (A + B + C).

(18) Percent appropriate matches: Total number of "hits" divided by total number of teacher questions, i.e., $\frac{B}{(A + B + C)}$.

(19) Percent questions higher than indicator: C divided by total teacher questions i.e., $\frac{C}{(A + B + C)}$.

(20) Percent questions lower than indicator: A divided by total teacher questions i.e., $\frac{A}{(A + B + C)}$.

(21) Matrix 2: Teacher questions by Pupil Response.

Your fourth major goal in your tutoring is to obtain appropriate pupil responses to cognitive questions asked. For instance, if you ask an inference question, you should expect to obtain an inferential response from the pupil. Matrix 2 provides feedback which indicates your efficiency in obtaining appropriate responses or matches to your questions.

In examining Matrix 2, the most important feature to note is the diagonal as indicated by segment E. This diagonal will show you the number of "appropriate matches" made. An "appropriate match" occurs each time you ask any question in the TPQR hierarchy and the pupil responds at the same level. The numbers in segment D give you the instances by cognitive level when the pupils response to a teacher question was at a higher cognitive level in the TPQR system than the question asked. For example, if you ask a sequencing-paraphrasing question and the pupil responds with an inferential response, than an inappropriate response will occur in segment D.

Similarly, the numbers in segment F give you the instances by cognitive level when the pupil response to a teacher question was at a lower cognitive level in the TPQR system than the question asked. For example, if you ask an inferencial question and the pupil responds with a recall response,

then an inappropriate response will occur in segment F.

(22) Total Teacher Questions - Pupil Responses = D + E + F. In Matrix 2 that is, the Grand Total of Teacher Questions and Pupil Responses which occurred during the lesson.

(23) Percent Appropriate Matches - The total number of appropriate matches divided by total Teacher Question - Pupil Responses = $\frac{E}{D + E + F}$.

(24) Percent Questions higher than Response = $\frac{F}{D + E + F}$

(25) Percent Questions lower than Response = $\frac{D}{D + E + F}$

(26) TFQR Interaction Sequence Summary

At the beginning of each lesson, you are expected to start asking questions at the cognitive level indicated by the arrow in the scope. This would be the discrimination level. (Please refer back to the rules for arrow movement in the explanation of the scope display).

If you asked a question at the cognitive level indicated by the arrow and the pupil responded at that level, then a new line on the printout would have begun, (Note! Each line on the printout is called a string) and the arrow would have moved up one level to the right on the scope. When this occurred you should have then asked a question at the next cognitive level indicated by the arrow. However, if your question and the pupils appropriate response were at any other cognitive level than that indicated by the arrow, there would be no change in the arrow position. Note, if 3 consecutive questions are asked at the cognitive level indicated by the arrow and no appropriate pupil response is given, the arrow then drops back one level to the left and the string ends. If the arrow reaches PS (Problem-Solving) and the appropriate question and response are given, the string ends and the arrow will move down to the level of the next lower question asked. Note, the above does not apply to pupil questions and teacher responses.

(27) Mean String - total domber of behaviors (codes)/total number of strings (see 30).

(28) Median string

(29) Standard Deviation of String

(30) Number of Strings

(31) Number of Completed Sequences - number of times that you have successfully completed the sequence from discrimination to problem solving.

(32) Percent Completed Sequences - Number of completed sequences divided by number of strings (#31/#30).

(33) Number of codes = total number of behaviors

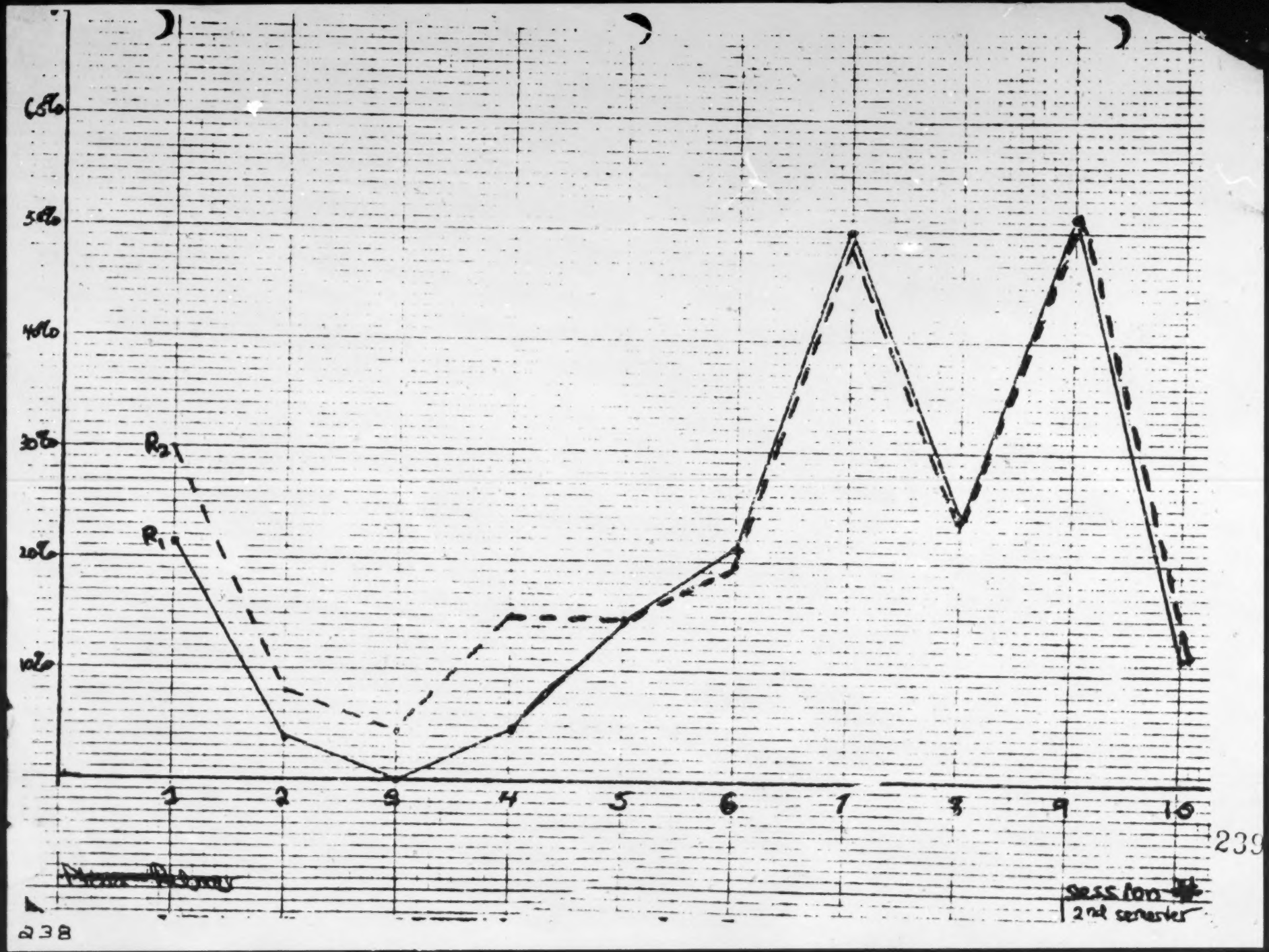
(34) Interaction String list - the complete list of all behaviors in the lesson in chronological order. T=1, P=2. 50 indicates a no response was given to the prior (not shown) teacher question.

Graphical Analysis of CATTS - Printout

Each tutor will be given a graph of his baseline behavior (without feedback) for approximately ten lessons. These graphs (see Example -) will be like graphs of the percent high-level teacher questions (labeled ratio 2) and the percent high level pupil response, (labeled ratio 1). The x-coordinate as shown is the session number (sessions are in chronological order) and the y-coordinate is percent.

Each tutor will regraph the information on the provided graph paper. In addition, after each lesson, the tutor will graph the same ratios as they appear on their printout sheets as numbers 13 and 14 (see CATTS - printout key for further explanation). Please indicate R_1 by a solid line and R_2 by a dotted line, so that the graphs may be easily compared.

Ideally, R_1 and R_2 should be approximately parallel. Please do not graph any lesson that has fewer than 10 questions.



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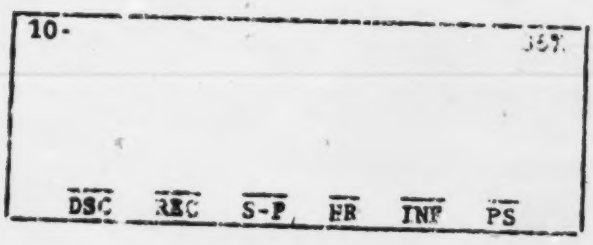
APPENDIX J

CATTS-SCOPE Feedback

Module IV K 495 M. Sitko

CATTS-SCOPE Feedback

For reading comprehension lessons, the CATTS video monitor in the booth will be turned on. The screen will display a moving bar graph that changes as you question the student. The bar graph will show you which question you have asked up to that moment and the relationship between use of the different questions to each other.

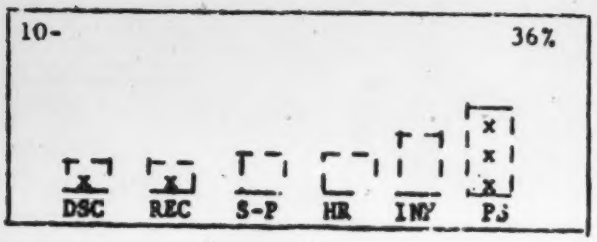


Video screen displays showing six question categories

Example 1

How it works: As you question, the coder transmits the code for the question to the computer, which then instantly shows its occurence by moving the bar for that question up a notch. When you first start your lesson the bars are flat along a horizontal axis, and the number ten shown at the top of the vertical axis (not actually seen). As a question occurs, the bar rises a constant amount for each occurance. A bar halfway up the scale tells you there have been five questions for the category represented by that bar.

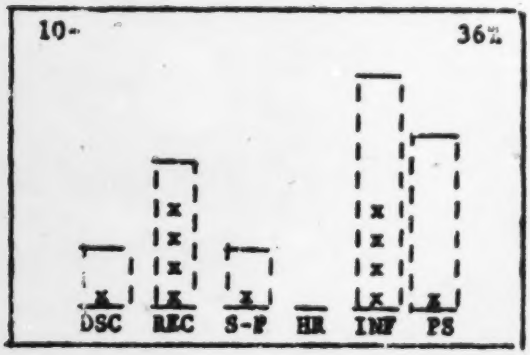
There will be an arrow starting at DSC to show the indicated question level, the movement of which will follow the rule described after Example 3. The number in the upper right hand corner is the percent teacher questions.



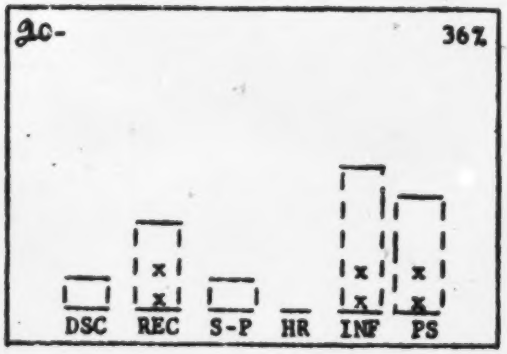
Example 2

In Example 2, you can see that there have been five INF questions, about 7 or 8 PS questions asked and two HR questions asked. The x's indicate pupil responses at that level. In Example 2, there was one DSC response and three PS responses.

As the bar for any category reaches ten, the display will cut off for a moment and then reappear scaled down by one-half. A 20 will show on the vertical axis in place of the 10 and each bar will be half as tall as it was before. See Example 3.



Ten Scale for beginning part of lesson.



Twenty scale used after any category reaches ten.

Example 3. Change in scale after ten questions in any one category.

In order to help you complete the hierarchy by moving the arrow for the indicated question level to the right, here are some rules for movement of the arrow:

(1) At the beginning of the session, the arrow will be at DSC. (Arrow position = Indicated question level).

(2) If the question and the response are at the indicated question level, then the arrow will move to the next higher level.

(3) If the question and the response are at the same level but higher or lower than the indicated question level, then there is no change in the arrow position.

(4) If the question and the response are at different levels, but the question is at the indicated question level, then, after this occurs three times, the arrow position decreases to the left.

(5) If the question and the response are at different levels, and the question is above or below the indicated question level, then there is no change in the arrow position.

(6) If the question and the response are at the same level and that level is problem solving (PS), then the arrow returns to the level of the next lower level teacher question.

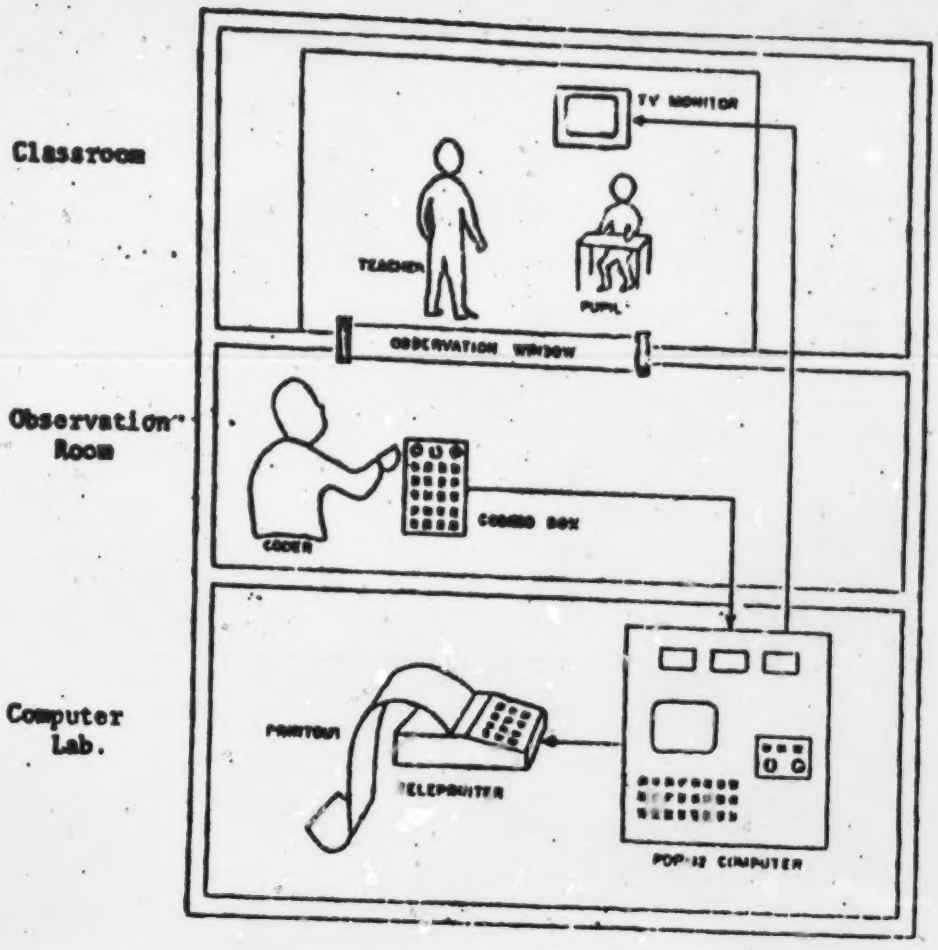


Figure 1. Arrangement of Laboratory Classroom for CATTS.

APPENDIX K

Module 3-B

Interpretation of Printout Feedback

K495 Practicum in Reading

As indicated in Module 1, the CATTS system of teacher training is designed to provide the teacher trainee with objective information about his/her individual pattern or use of different teaching strategies during a given lesson. The system uses trained classroom observers to code lessons. The data they obtain is transmitted to the computer in "real time" (as soon as it is mechanically punched in on the button-box). The computer then transmits the information obtained from the coder into a data storage file for later use, or it analyzes the data and feeds it back to the teacher - also in "real time."

In the present use of CATTS, we shall use the computer to perform both these functions. The data that is stored will be retrieved and printed out so that each teacher can review it and have an objective picture of his/her individual use of different teaching strategies (represented by each of the categories on the Teacher Pupil Question Response System.

You are to employ this printout feedback for analyzing pupil responses and your questioning strategies, and then use the resulting analysis to formulate goals for your next lesson.

EXAMPLE OF CATTS PRINTOUT SHEET

TPQR
K495

1) Teacher: _____ Date: _____

Pupil: _____ Time: _____

Session Length: _____

Teacher
Question

2) level	9) Freq.	10) %Freq.	11) Freq. Bar Graph (#=?; *=App. Res.) 0 10 20 30 40 50
3) DSC	X	X	####
4) REC	X	X	***
5) S-P	X	X	######
6) HR	X	X	**
7) INF	X	X	
8) PS	X	X	

12) Percent Teacher Questions = xx%/
13) Percent high level teacher questions over the total questions asked=xx%.
14) Percent high level pupil responses over the total responses given = xx %.
15) Matrix 2: Teacher questions by pupil responses

TCHR.

QUEX.	DSC	REC	S-P	HR	INF	PS	Total
DSC	x	x	x	x	x	x	x
REC	x	x	x	x	x	D x	x
S-P	x	x	x	x	x	x	x
HR	x	x	x	F x	x	x	x
INF	x	x	x	F x	x	x	x
PS	x	x	x	x	x	x	x
Total	x	x	x	x	x	x	x

16) Total teacher question-pupil responses = _____
17) Percent appropriate matches = _____
18) Percent questions higher than response = _____
19) Percent questions lower than response = _____

20) TPQR Interaction Sequence Summary

~~Frequency Distribution of Interaction Strings~~

21) Mean string = _____
22) Median string = _____
23) S.D. of string = _____

24) Number of strings = _____
25) Number of completed sequences (to PS) = _____
26) Percent completed sequences (to PS) = _____
27) Number of codes = _____

28) Interaction Strings

50	32	42	T3	50	T2	P2	
18	33	44	60	T2	P2	T3	P3

Module VII 3495 Dr. Sitko

CATTS Printout Key

(1) Status data: This information identifies the printout by telling the reader who did the tutoring (teacher), who was tutored, (pupil), on what day (date), at what time (time), and for how long (session length).

(2) Teacher Question Level: Teacher questions are characterized as a continuum ranging from lower level to higher level depending on the cognitive processes that the question requires one to use in formulating an answer. (See Module 2)

(3) DSC: Discrimination

(4) REC: Recall

(5) S-P: Sequencing - Paraphrasing

(6) HR: Hierarchical Relating

(7) INF: Inference

(8) PS: Problem Solving

See module 2 for a complete definition of these levels numbers (3) - (8).

(9) FREQ: This column indicates the number of times each level of question is asked by the teacher.

(10) %FREQ: This is frequency divided by the total number of questions. (see number 17 for the total number of questions)

(11) FREQ. BAR GRAPH: This is a graph of the number of teacher questions at each cognitive level (designated by #) in the TPQR Observation System, and the number of pupil responses at the same cognitive level as the question asked (designated by *). Please note that pupil responses on a cognitive level different from that of the question asked are not shown on the bar graph.

*(12) Percent teacher questions: The % of TQ is the number of questions the teacher asked divided by all teacher behavior(-that is, the sum of all

teacher questions plus all teacher responses to pupil questions plus all other teacher talk (See TPQR Observation System). *Your first major goal for the practicum is to keep your percent teacher questions between 30% to 50%. **(13) Percent high level teacher questions over the total questions asked: High level teacher questions include Sequencing Paraphrasing, Hierarchical-Relating, Inferenca and Problem Solving. **Your secondary major goal is to maximize the percentage of High Level Questions you ask relative to the percentage of Low Level Questions asked (e.g., Discrimination and Recall Questions.) (14) Percent high level pupil responses over the total responses: High level responses include Sequencing-Paraphrasing, Hierarchical-Relating, Inference and Problem Solving. In addition to maximizing high level questions, your third major goal in your tutoring is to develop the skills required to ask in sequential order the total hierarchy of six questions on the TPQR system and receive appropriate pupil responses to each of these types of questions. To achieve this goal in each lesson you must ask questions beginning at the lowest cognitive level (discrimination) and sequentially continue up the hierarchy to the highest level (Problem Solving).

In order to help your pupil develop higher cognitive processes, you should lay an appropriate foundation for the pupil. This can be achieved by starting out on the lesson content asking discrimination question and getting the appropriate response from the pupil. You should continue asking questions at the discrimination level until the pupil gives the desired response. Similarly, you should follow this procedure at each cognitive level in the TPQR system going up the hierarchy from discrimination to problem solving.

For example, assume the pupil is in the middle of reading a story, you may ask pointing to a picture "What color is the lion in the picture?"

(a discrimination question). Continue at this cognitive level with similar questions until you are confident that the pupil understands your question and gives an appropriate discrimination response. Then ask the pupil to recall what happened on the preceding page (a recall question). Continue in the manner described above. Then ask the pupil to retell the story up to that point in his/her own words. (A sequencing-paraphrasing question). Continue as above. Then ask the pupil to explain why it rains (assume it is raining in the picture). Then ask the pupil what he thinks would happen if the lion left the forest and went to live in the zoo (an inference question). Then, ask the pupil what would s/he do in a new place to make new friends.

Please note that if you think your pupil is not following the lesson plan, do not be afraid to drop back to a lower cognitive level in order to help your pupil to a better understanding of the story. It is important to ask your questions in the form of a question as described in Module II, TPQR Observation System, pages 4-5.

(13) Matrix 2: Teacher questions by Pupil Response.

Your fourth major goal in your tutoring is to obtain appropriate pupil responses to cognitive questions asked. For instance, if you ask an inference question, you should expect to obtain an inferential response from the pupil. Matrix 2 provides feedback which indicates your efficiency in obtaining appropriate responses or matches to your questions.

In examining Matrix 2, the most important feature to note is the diagonal as indicated by segment E. This diagonal will show you the number of "appropriate matches" made. An "appropriate match" occurs each time you ask any question in the TPQR hierarchy and the pupil responds at the same level. The numbers in segment D give you the instances by cognitive level when the

pupil's response to a teacher question was at a higher cognitive level in the TPQR system than the question asked. For example, if you ask a sequencing-paraphrasing question and the pupil responds with an inferential response, then an inappropriate response will occur in segment D.

Similarly, the numbers in segment F give you the instances by cognitive level when the pupil response to a teacher question was at a lower cognitive level in the TPQR system than the question asked. For example, if you ask an inferential question and the pupil responds with a recall response, then an inappropriate response will occur in segment F.

(16) Total Teacher Questions - Pupil Responses = D + E + F. In Matrix 2 that is, the Grand Total of Teacher Questions and Pupil Responses which occurred during the lesson.

(17) Percent Appropriate Matches - The total number of appropriate matches divided by the total Teacher Question - Pupil Responses = $\frac{E}{D + E + F}$.

(18) Percent Questions higher than Response = $\frac{F}{D + E + F}$.

(19) Percent Questions lower than Response = $\frac{D}{D + E + F}$.

(20) TPQR Interaction Sequence Summary

At the beginning of each lesson, you are expected to start asking questions beginning at the discrimination level and systematically continue up the TPQR question hierarchy as indicated in (14).

If you asked a question at any of the six cognitive levels and the pupil responded appropriately at that level, then a new line on the printout would have begun. (Note: Each line on the printout is called a string.) When you obtain an appropriate response at any level you should then ask a question at the next higher cognitive level. If the pupil fails to give the appropriate response to your question, ask another question at the same cognitive level.

However, do not ask more than 3 questions in a row at the same cognitive level if no appropriate pupil response is given. Note, if no appropriate pupil response is given after 3 consecutive questions are asked at a particular cognitive level, the printer on the printout will terminate the string and a new line will begin on the printout. If you reach the problem solving level in the hierarchy and obtain an appropriate response, you should start a new pattern of questionning by beginning at the discrimination level again.

(21) Mean String - total number of behaviors (codes)/total number of strings (see #24).

(22) Median string

(23) Standard Deviation of String

(24) Number of Strings

(25) Number of Completed Sequences - number of times that you have successfully completed the sequence from discrimination to problem solving.

(26) Percent Completed Sequences - Number of completed sequences divided by number of strings (#25/#24).

(27) Number of codes = total number of behaviors

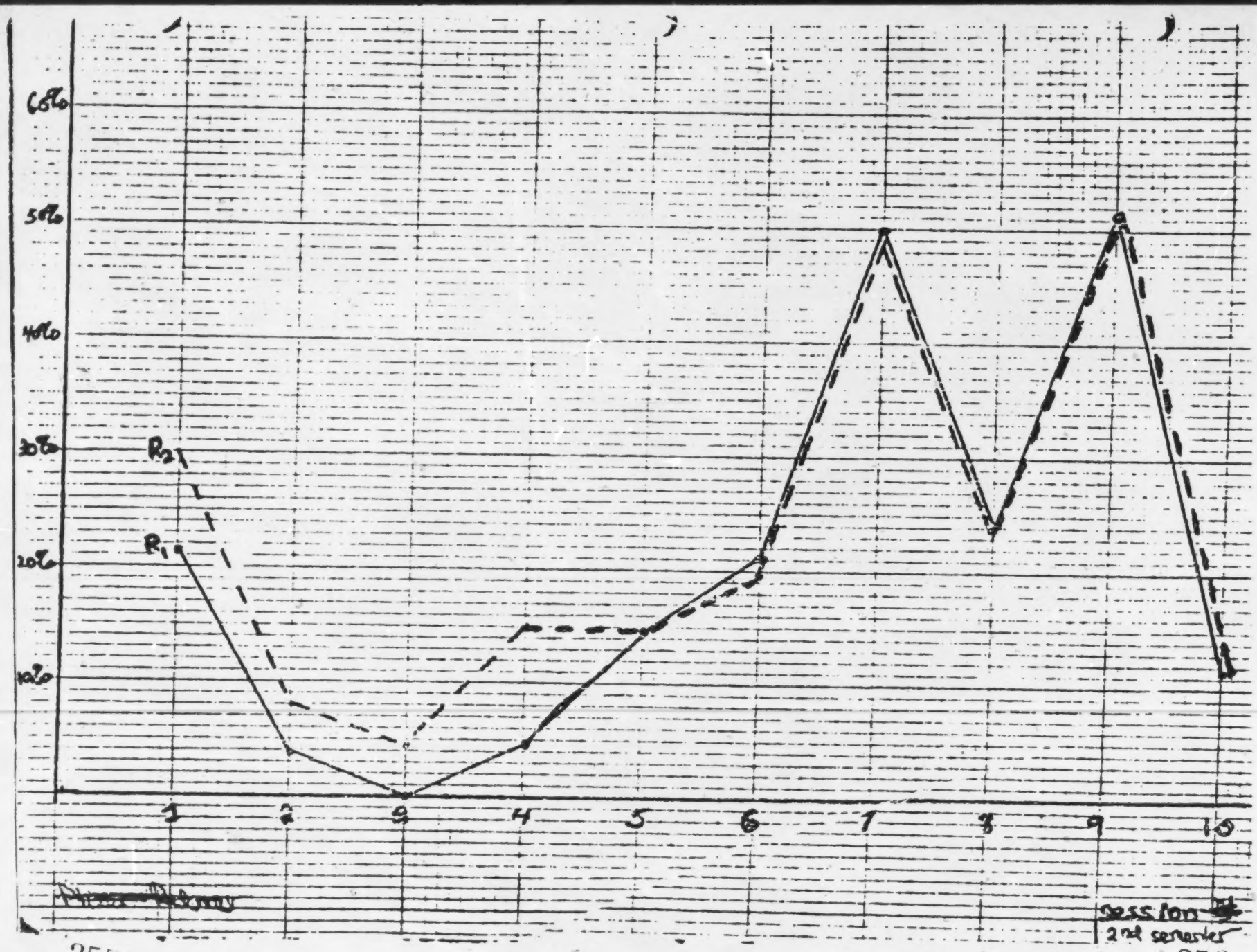
(28) Interaction String list - the complete list of all behaviors in the lesson in chronological order. T=1, P=2. 5-0 indicates a no response was given to the prior (not shown) teacher question. Refer back to the TPQR Observation System (Page 3 - Module 2).

Graphical Analysis of CATTS - Printout

Each tutor will be given a graph of his baseline behavior (without feedback) for approximately ten lessons. These graphs (see Example -) will be like graphs of the percent high-level teacher questions (labeled ratio 2) and the percent high level pupil response, (labeled ratio 1). The x-coordinate as shown is the session number (sessions are in chronological order) and the y-coordinate is percent.

Each tutor will regraph the information on the provided graph paper. In addition, after each lesson, the tutor will graph the same ratios as they appear on their printout sheets as numbers 13 and 14 (see CATTS - printout key for further explanation). Please indicate R_1 by a solid line and R_2 by a dotted line, so that the graphs may be easily compared.

Ideally, R_1 and R_2 should be approximately parallel. Please do not graph any lesson that has fewer than 10 questions.


60%
50%
40%
30%
20%
10%
R2
R1
1
2
3
4
5
6
7
8
9
10
Session
2nd semester

APPENDIX L

CATTS TPOR Coding Record

CATIS TPQR CODING RECORD

BOOTH NO. _____ DATE _____

LESSON NO. _____ TUTOR NAME _____ PUPIL _____

TUTOR _____

PUPIL NO. _____ BOX UP _____ BOX DOWN _____

CODER NO. _____

TIME _____

FEEDBACK _____

SEN _____

LESSON NO. _____ TUTOR NAME _____ PUPIL _____

TUTOR NO. _____

PUPIL NO. _____ BOX UP _____ BOX DOWN _____

CODER NO. _____

TIME _____

FEEDBACK _____

SEN _____

LESSON NO. _____ TUTOR NAME _____ PUPIL _____

TUTOR NO. _____

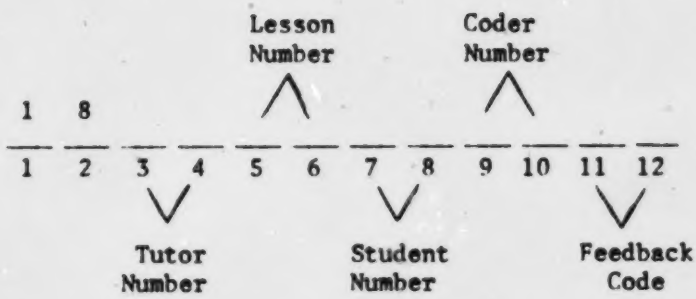
PUPIL NO. _____ BOX UP _____ BOX DOWN _____

CODER NO. _____

TIME _____

FEEDBACK _____

SEN _____



FEEDBACK CODES

ø1 - Baseline
ø2 - Video & Printout
ø3 - Scope & Printout
ø4 - Supervisor & Printout

APPENDIX N

Objective Evaluation of Lesson Interaction on Other Criteria

OBJECTIVE EVALUATION OF LESSON INTERACTION ON OTHER CRITERIA*

*(Based on Helping Nonexpressive Children in the Classroom. A Self Instructional Module by J. Everton & W. Lynch, CITH.)

ELABORATION

Any child talk other than reading is to be recorded in this observation system. The categories of this system are:

1. One Word Utterances
2. Sentence Fragments
3. Simple Statements
4. Compound Statements of "Strings"
5. Complex Statements
6. Yes, No, Ok . . .
7. I Don't Know, I Can't, No Response . . .
8. Habitual Responding

1. **ONE WORD UTTERANCES** (excluding articles)

ex. 1 T: What was the hero's name?
P: Michael.
ex. 2 T: Why does this begin with a capital letter?
P: A name.

2. **SENTENCE FRAGMENTS** This category describes a response that is more than one word, but not a complete sentence.

ex. 1 T: What part of the story did you like best?
P: When they were in the rain.
ex. 2 T: Explain what evaporation is.
P: When you heat water to boil.

3. **SIMPLE STATEMENTS** A simple statement or sentence is a complete thought. It is simple in the sense that it asserts a single idea: a fact, a definition, a rule, an expression of opinion or feeling. It contains no conditions or qualifications--no "if", "because", "but", "when", of other modifying clause. (Everton & Lynch, 1976)

ex. 1 T: What part of the story did you like best?
P: I liked the part about the rain.
ex. 2 T: Why is this number wrong?
P: You put the decimal on the wrong side.*

*N.B. A simple sentence can contain adverbial phrases.

4. COMPOUND STATEMENTS OR "STRINGS" Normal expression generally involves extensive use of compound clauses connected in "strings." This is characteristic of children who are motivated, and who have several things they want to mention, as in retelling a story: ". . . and then he . . . and then they . . . ." (Everton & Lynch, 1976)

ex. 1 T: What happened in this story?
P: Everyone got on the bus and the bee got on and then off went the horse and off went the dog . . .
ex. 2 T: Why is that a better way to do problem 6?
P: You write down the answer to the first part and then you won't forget it.

5. COMPLEX STATEMENTS These are the most complex and most mature forms of oral expression. They are most easily recognized by the presence of dependent clauses that follow the main clause (or sometimes precede it.)

Complex sentences can be detected by key words (conjunctions) that frequently signal a dependent clause: because, since, unless, except, if, while.

Less frequently children use adverbial or adjectival clauses to modify the main clause of their sentences, signalled by such words as: whenever, wherever, when, who, which.

Complex sentences can be distinguished from compound sentences by the fact that there is a more complex thought represented in the utterance--a qualification, modification, or relationship--rather than just several ideas linked together. (Everton & Lynch, 1976)

ex. 1 T: What happened next in the story?
P: When the children didn't know which road to take, they went up to the old farmhouse to ask.
ex. 2 T: How do you feel when someone tells on you?
P: It really makes me mad, especially when it's someone who's always doin' bad things himself.

6. YES, NO, OK . . .

7. I DON'T KNOW, I CAN'T, NO RESPONSE

8. HABITUAL RESPONDING The responses belonging in this category include sounding out words, child talk to self, repetition of teacher talk and ritualized responses that are learned or memorized.

ex. 1 T: How does a long vowel sound?
P: It says its own name.
ex. 2 T: Do you know any rhymes?
P: Mary had a little lamb . . . .
ex. 3 T: What does "T" say? Put the two sounds together.
P: "T - ST - STOP"

It is also necessary to know at what point in the lesson the child's responses in these various categories occur. Therefore, the lesson is divided into three sections:

1. ORGANIZATIONAL This is when the lesson is being set up. The teacher and child are getting organized. These are frequently procedural items.

   ex. 1 T: How are you today? Are you ready to read a story?
   P: Today's my birthday. I brought a cake to school.
   ex. 2 P: I forgot my pencil.
   T: Here's a pencil Now let's see what we have for today. (The teacher is moving into the body of the lesson.)

2. BODY This includes teacher motivational techniques, setting the tone of the lesson, explanations of what will be done, the lesson itself, and post-lesson questions and talk on the subject matter.

   ex. 1 T: Yesterday, you went to the zoo. What did you see there?
   P: We saw monkeys, and seals that ate fish from us.
   ex. 2 T: These words are in our story. How many do you know?
   P: Sand, play, seashore . . . .

3. CLEAN-UP This category includes any talk or responses that occur after the body of the lesson is over. Again most items here are procedural. Sometimes there are value questions in this section. The teacher and pupil are getting ready to leave.

   ex. 1 T: You read that story well. Now you can read it to your little brother.
   P: Can I carry the books and pencil back?
   ex. 2 T: What would you like to do next time?
   P: I want to play a game next time!

ELABORATION

Put a check in the proper category for all child talk other than reading.

	ORGANIZATIONAL	LESSON BODY	CLEAN-UP
1 ONE WORD UTTERANCES			
2 SENTENCE FRAGMENTS			
3 SIMPLE STATEMENTS.			
4 COMPOUND STATEMENTS OR "STRINGS"			
5 COMPLEX STATEMENTS			
6 YES, NO, OK . . . (SPONTANEOUS SPEECH)			
7 I DON'T KNOW I CAN'T NO RESPONSE . . .			
8 HABITUAL RESPONDING			

APPENDIX O

Tutor Schedule

TUTOR SCHEDULE - K495 SPRING 1976

Tuesday	A	B	C
8:45-9:15	Gember-08 (Dona 03) video	McElroy-14 (Carla 06) scope	Seifert-20 (Jan 02) super
9:15-9:45	Maggi-13 (Mark 05) super	Gaughan-07 (Alice 09) scope	Zettlemeier-22 (Keith 11) video
9:45-10:15	Pawlik-17 (Sam 01) video	Gross-10 (Richard 07) scope	Rogers-18 (Jim 10) super
10:15-10:45	Gallogly-06 (Terry 04) super	Lohmuller-12 (Mark 05) scope	Palmer-16 (Melinda 08) video
10:45-11:15	Newhouse -15 (Terry 04) video	Conklin -03 (Keith 11) scope	Bailey-01 (Alice 09)
11:15-11:45	Gould-09 (Sam 01) super	Bieritz-02 (Richard 07) scope	Feinstermaker-05 (Jim 10) video
Thursday			
11:00-11:30	Feinstermaker-05 (Jim 10) video	Bieritz-02 (Richard 07) scope	Gould-09 (Sam 01) super
11:30-12:00	Felkel-04 (Dona 03) super	Strouts-21 (Jan 02) scope	Koday-11 (Melinda 08) video
Friday			
8:45-9:15	Gember-08 (Dona 03) video	McElroy-14 (Carla 06) scope	Koday-11 (Melinda 08) video
9:15-9:45	Maggi-13 (Mark 05) super	Gaughan-07 (Alice 09) scope	Zettlemeier-22 (Keith 11) video
9:45-10:15	Palmer-16 (Melinda 08) video	Strouts-21 (Jan 02) scope	Gallogly-06 (Terry 04) super
10:15-10:45	Seifert-20 (Jan 02) super	Lohmuller-12 (Mark 05) scope	Newhouse-15 (Terry 04) video
10:45-11:15	Pawlik-17 (Sam 01) video	Gross-10 (Richard 07) scope	Bailey-01 (Alice 09)
11:15-11:45	Felkel-04 (Dona 03) super	Conklin-03 (Keith 11) scope	Rogers-18 (Jim 10) super